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The Detection of Tubercle Bacilli in Milk.

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(Presented to North Midland V.A.)

As dairy inspection is a subject of rapidly increasing importance, I think it should receive more attention from the veterinarian than it has done in the past.

We are the profession properly qualified to safeguard the public from dirty and diseased milk, but it is astonishing how few people seem to realise this fact. Even laymen who belong to the educated classes seem to have very little idea of the thoroughness, length and expense entailed in the training of a veterinary surgeon, and unless we take great care to safeguard our interests, I fear we will not occupy our proper sphere in Public Health work, for which we are peculiarly well fitted.

Besides being a good clinician and having a thorough knowledge of cattle, the dairy inspector should be an efficient microscopist, because in a very short time with the use of the microscope an accurate diagnosis can be made, and if he combines the microscopic work with his clinical examination, he is likely to be much more painstaking. I mean by this, that if one is examining a special sample of milk for someone else, one has not a mental impression of the case, and after a short unsuccessful search for the suspected organism, one gives it up, whereas if you have examined the animal you say to yourself, "but it was very like a case of T.B. mastitis," and you continue the search or you make another slide, frequently with successful results. That is one of the reasons, I think, why the veterinary officer (I prefer the word officer or veterinary surgeon to inspector, because the very word inspector seems to make some farmers' blood boil) should do the microscopic examinations. I consider it would be to the general advantage if he also did the biological tests. The more one has to do in connection with a particular subject, the more interesting it is, and consequently the keener the individual will be on his work. I think that every Local Authority should have a Public Health Laboratory, to which the veterinary inspector could have access for this work, and to give him an opportunity of investigating an unusual or specially interesting case. It is most discouraging when one comes across a rather baffling case and one has no opportunity to determine its nature.

General appearance of the herd.—In examining a herd to detect a cow giving tuberculous milk, it is well to have a general look at the cows before commencing to examine them individually. In the summer time, when they are at grass, this is easily done by watching them as they come into the cowshed to be milked. One can note the general condition of the herd, looking for thin ones, and noting any with suspicious coughs; one can also guess the approximate ages, remembering that the older cows are those most likely to suffer from tuberculosis. In this way one feels that the case of T.B. mastitis is likely to be one of so many cows, and this all helps in the examination. In the great majority of cases the cows with T.B. mastitis are those which have had three calves or more. I have only seen two cases in first-calf heifers.

Method of clinical examination of the udder.—It may seem hardly necessary to mention such a simple thing as the examination of a cow's udder, but it is much more important than it seems, and until one does it thoroughly and methodically, one will miss a few cases of tuberculous mastitis that otherwise would have been detected.

Before commencing an examination of the udder, it is advisable to have the cow milked, as the udder in its collapsed condition is much more easy to palpate, and the size of different quarters if due to disease is more obvious. In the case of simple hypertrophy of a quarter, before the cow is milked it appears much larger than its neighbour, but when milked out, as a rule, very little difference in size and none in texture can be detected.

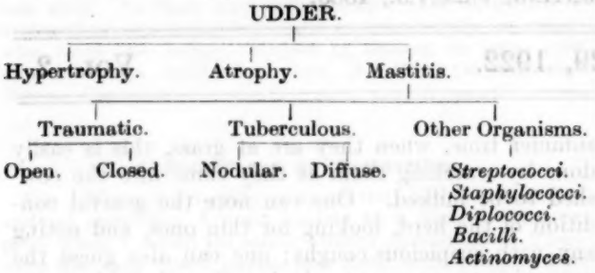
I stand about two yards immediately behind the cow, viewing the hind quarters of the udder, then I move a little to the right and view the right forequarter, a little to the left and view the left forequarter, noting any difference in size and shape.

Taking the tail in the right hand and standing behind the cow and a little to the right, I palpate the hind quarters and then the fore quarters, with the left hand, then feel for the left supramammary with the left hand, and palpate all the left side of the udder, afterwards doing the same on the right side. This latter procedure may seem rather superfluous, but I can remember one instance where a cow in a herd giving tuberculous milk was not located until the third visit, and that was because there was just one small tuberculous nodular area in the upper lateral aspect of the left hind quarter.

Unless one is left-handed, palpation with the left hand is rather difficult and unsatisfactory at first, but it has the great advantage that by so doing one is standing just to the right side of the cow (*i.e.*, the

milking side), and most cows are quieter when manipulated from this side.

I will now deal with some conditions of the udder purely from the veterinary inspector's point of view, which I have briefly classified :—



From every point of view the most important condition is tuberculous mastitis, because the milk, although teaming with bacilli, may be unchanged in appearance to the naked eye, and no matter how much the udder may be enlarged and indurated, unless there is some very noticeable change in the appearance of the milk, the great majority of farmers continue to sell it for human consumption ; whereas if the milk is found to be clotted or discoloured in any way, it is at once withheld from sale. On account of its great importance, tuberculous mastitis and its differential diagnosis calls for special attention.

Tuberculous mastitis occurs in two forms—nodular and diffuse. The former is the much more difficult to diagnose, because the affection may occur anywhere in the udder, may be limited to one small part, may be deep seated and not easy to palpate, and difficult to distinguish from indurations the result of some other form of mastitis. If the supramammary gland can be felt enlarged, it is a great aid to diagnosis, and means that if the milk is not changed in appearance, it will take a microscopic examination to say that it is not tuberculous. In every case of tuberculous mastitis, except those very rare cases, which I have never seen, where the tubercle bacilli pass up the teat or gain entrance through a wound in the skin (and even in these cases it would only be in the early stages that the gland would not be affected), the supramammary gland is enlarged; and as nearly all dairy cows are in store condition, it is generally possible to palpate it and recognise the enlargement. If a hind-quarter is affected, the gland on that side can usually be felt to be larger than its neighbour, and where both hind-quarters are affected, the quarter which is worse will have the larger gland on this side. Now I am aware that some authorities attribute no importance to the supramammary gland, but that has not been my experience ; in fact, it has been just the opposite. I attach the greatest importance to its detection, and always feel for it.

In the diffuse form, where one has an interstitial tuberculous mastitis, the diagnosis is easy, except in the very early cases. There is considerable difference in the rapidity with which it develops and some slight variation in the type of lesion. In the more common type one gets a general enlargement of one quarter, which may develop in as short a time as ten to fourteen days, but usually it takes much longer. The quarter is very hard on palpation, just as though one were feeling wood through the skin. The supramammary gland can be felt very much enlarged, and the milk examined on the spot is unchanged to the naked eye, except in very old cases, and then it varies from a light grey colour to a dirty fawn yellow, with a heavy deposit on standing. There is no pain on manipulation. It is commonly said that if the milk has a pink tint from the presence of blood it is not tuberculous, and although this is true in the great majority of cases, it is not always so. Cases do occur where the infection is so rapid that one gets small hæmorrhages into the ducts, a condition somewhat similar to that seen in pulmonary tuberculosis, with small intermittent hæmorrhages.

In another type of the diffuse lesion the disease seems to attack the circumference of the mammary tissue, so that the hardness seems like an arc of a circle. I have only seen two cases of this type in two and a half years.

So far as the infection of the milk is concerned, the diffuse interstitial tuberculous mastitis is the most serious type of lesion, because the milk simply teems with bacilli, and a microscopic examination is successful in every case. This condition can be diagnosed clinically and microscopically with accuracy.

There is no doubt the nodular form, which is more frequently met with than the diffuse, is sometimes difficult to diagnose, but if one weighs up the evidence for and against carefully, and one gets a reliable history, a correct diagnosis should be the result.

Clinical Differential Diagnosis.

From an ordinary acute streptococcic or staphylococcic mastitis the differentiation is easy, because in this condition there is the constitutional disturbance and acute inflammation of the udder. The cow may be off her food, have a slight rise in temperature, the udder much enlarged, painful ; the milk containing numerous little yellowish coagula, and forming a very heavy deposit on standing. The case may recover and the gland be very little indurated, but more commonly the whole of the glandular tissue is destroyed, and during this process the secretion looks just like lymph containing yellow flakes. Where the animal recovers from a non-tuberculous mastitis, and there is some induration of a quarter remaining, it is sometimes rather difficult to distinguish from tuberculous mastitis, but in this case the supramammary gland is not enlarged, and the induration is not so nodular as in the diffuse type of lesion, which increases progressively, whereas the non-tuberculous decreases as the connective tissue which replaces the mammary tissue becomes older. As the connective tissue shrinks the quarter generally becomes distorted in some way, and although this cannot always be seen, it can generally be felt. A true history is also a great help.

I would distinguish tuberculous mastitis in an atrophied quarter from the induration resulting from non-tuberculous mastitis as follows. In the latter

form of mastitis the quarter is mis-shapen or distorted in some way, the induration is irregular, and there is likely to be no secretion resembling milk. In tuberculous mastitis the quarter shrinks *en masse*, so that although it feels lumpy, yet there is some definite shape about it and no distortion. It feels very like a shrunken quarter composed of marbles, rather irregular in shape and of various sizes. The secretion is small in quantity, and looks as though water had been added to it, or may be like serum.

From catarrhal mastitis, which affects the larger ducts and the galactophorus sinus, it is difficult to distinguish the nodular form affecting the region in the base of the teat. The supramammary gland is enlarged in both cases, and there is no naked-eye change in the milk. There is the absence of pain in both cases, and one should rely on the microscope to distinguish the two conditions.

There is a very mild form of mastitis due to a *diplococcus*, occurring in chains, which sometimes appears soon after calving. The affected quarter is enlarged, not painful, and not much indurated, the supramammary gland is enlarged, and the milk is not changed in appearance. In a week or two the condition clears up, and the affected quarter feels just like its neighbour. Again I rely on the microscope for diagnosis.

I once saw a case I thought was tuberculous mastitis of the diffuse type, although not quite typical, because the gland did not feel hard enough. There was a painless enlargement of the right hind quarter, and no change in the milk. I visited the farm to inspect the herd, because a road sample had killed two guinea-pigs in twenty-four hours. A special sample was taken from this cow and stained for acid-fast bacilli with a negative result. Another film was stained by Gram's method, which showed a *diplococcus* in great numbers. A sample was sent to the Sheffield University for the biological test. The following morning I visited the laboratory to see the guinea-pigs, one of which was just dying and the other moribund. As the case was of special interest, cultures were made from the heart blood and spleen of the guinea-pigs. The cultures showed a *streptococcus* in pure culture. Although this was a most interesting case, and the only one of the kind I have seen, I could not carry out any investigations on account of a lack of facilities. I will show a slide of this organism.

Once in following up a tuberculous road sample, I came across a rather unusual case, and as it is the only one of the kind I have seen, I will describe it. The cow was a real "screw," which also suffered from mastitis (non-tuberculous, I thought) of the left hind quarter. The rest of the herd seemed to be free from disease of the udders, so I took a sample from the tuberculous cow. A microscopical examination of her milk showed numerous *streptococci*, and as they were soon detected, I ceased any further examination of the slide. A sample was sent to the University for biological examination, and in a month was reported tuberculous. The cow mentioned had been sent to the knackers, and as I was not notified, unfortunately I did not get a *post-mortem*. But there is no doubt she suffered from streptococcic and tuberculous mastitis of the same quarter.

For mixed milks the biological test is essential to determine whether they are tuberculous or not, but with regard to special samples taken from a suspected quarter or quarters, I think that one should not have recourse to that test, until a thorough microscopic examination has been made. It has for a long time been realised that the weakness in the biological test for tubercle bacilli in milk is the length of time one has to wait for a definite report. This varies in different laboratories, but in Sheffield it is generally about twenty-eight days. The only other way of being really certain when the clinical evidence is not absolutely convincing is by microscopic examination of the milk.

With a view to stopping the milk of a cow affected with tuberculous mastitis at the earliest possible moment, after April, 1919, I started examining some of the special samples from cows that showed fairly conclusive clinical evidence. As the results achieved were very satisfactory, the number of microscopic examinations was progressively increased, until towards the end of 1919 all the special samples taken were examined microscopically. In January, 1920, definite records were kept, and from these records the following statements are made :—

The average number of cows found on the farms visited was 14, and we estimate the average yield per cow per day at 2¼ gallons. If the examination of the milk microscopically results in the demonstration of tubercle bacilli, a visit is at once paid to the farm and the milk from that cow stopped, and in every case an effort is made to have the animal slaughtered. In practically every case this means that the milk from the rest of the herd is now free from tuberculous infection, whereas if one was to wait for the biological test (*i.e.*, 28 days), then the consumers of the milk from this dairy would be drinking tuberculous infected milk for this period. As a rule at the end of the 28 days the report comes in that the control sample, that is, the sample from the remainder of the herd, is free from tuberculous infection.

Now, estimating the milk yield per day from each cow at 2¼ gallons, and the average number of cows on the farms at 14, and the fact that the milk has been freed from tuberculous infection for twenty-eight days, then the source of infection has been removed from 882 gallons coming into Sheffield.

In 1920 forty-two cows were found to be suffering from tuberculosis of the udder by microscopic examination of the special samples. Up to December 21st, 1921, fifty-six cows were found in this way, making a total of ninety-eight cows. Thus, 86,436 gallons of milk were freed from infection, which otherwise would have been tuberculously infected and consumed in the city.

The best method of staining tubercle bacilli in milk is Dèlèpine's method, in which he uses alcohol

and ether in equal parts to fix and clear the slide; but as my work is done in a public office, where I have no water or gas, I have to be content with the ordinary Ziehl-Neelsen's method for staining acid-fast bacilli. The heat is supplied by a spirit lamp and the washing of the slides is done by pouring water from a bottle over the slide into a pot. I mention this just to show that the work is not done under the most favourable conditions. We possess, however, a very good centrifuge, which works up to 3,000 revolutions per minute.

Where two typical tubercle bacilli have been found on one slide, we have considered that, with the clinical evidence, we had sufficient grounds on which to recommend slaughter of the animal. If no tubercle bacilli are found, the sample is then sent to the University for the biological test. It saves a great deal of time if one has the courage to give a definite diagnosis on two acid-fast bacilli, because if you are not satisfied with this, you may look a long time before you get just what you would call "a really typical picture," and you may not find one at all. So far we have recommended slaughter on just two typical tubercle bacilli, and have found from *post-mortem* evidence in every case that the cow from which the sample was taken had tuberculous mastitis. I go further and say that from the kinds of cells and their arrangement, although one finds no bacilli at all, one can say with a fair amount of certainty that a milk sample is tuberculous. One great advantage of this is that you can again visit the suspected animal in seven to ten days, note any change in the cow or the udder, and take another sample of milk. If the cow has tuberculous mastitis, it is very probable that you will find tubercle bacilli in this sample, and it will be fourteen to eighteen days yet before you will receive the report of the biological test.

When a number of suspicious milks have been examined, one becomes sufficiently expert to say in a very few minutes whether a slide is suspicious or not, from the arrangement and type of the cells present; and in non-suspicious cases this saves the tiresome process of hunting all over a slide, where there is little or no chance of finding any acid-fast bacilli.

Where one finds a number of *staphylococci*, *streptococci*, *diplococci*, etc., the case is easy, but frequently one examines a slide where there are a great number of cells present, but no organism can be seen. From the clinical condition of the udder and the number of cells present I feel confident that there must also be organisms, but I do not know their nature or how to stain them. This is the type of slide where one is inclined to hunt in vain for tubercle bacilli, because the clinical condition of the udder suggest tuberculosis, and there is the absence of other organisms on the slide, and it is very rare indeed that tubercle bacilli are present with other pathogenic organisms. The chief non-tuberculous feature of this kind of slide is the great irregularity of the cells present, which are of all shapes and sizes, and there is no definite arrangement, whereas in a slide from a tuberculous milk the cells are all more or less rounded, and the smaller ones take the stain more deeply; there are also present, and this is typical, larger circular, flat-looking cells, which stain rather faintly, and which are always arranged in clumps overlapping one another; there may be any number from five to twenty in one clump. They are so faintly stained that one can see through them, and by careful focussing one can pick out the outline of an underlying cell. If one finds such a clump of cells, you are almost certainly dealing with a tuberculous milk, and a careful search is generally rewarded by finding tubercle bacilli. If the slide presents the appearance I have described and no tuberculous bacilli have been discovered, another sample ought to be taken in eight to ten days for further examination.

The possibility of acid-fast bacilli, other than tubercle bacilli, being found on a slide is a very remote one. Occasionally in special samples of milk one finds large acid-fast bodies about 7—9 μ. in length, about 1—2 μ. in breadth, with rounded ends. This same organism or spore is found frequently in bovine fæces, and I take it that its presence in a sample of milk, shows fæcal contamination, which should not occur if proper precautions are observed in taking the sample. The same applies to Johnë's bacillus, which is very much smaller, not beaded, and usually it is arranged in clumps. Other acid-fast bacilli have been described as occurring in milk, but I am not aware of having seen any in my examinations. In Dèlèpine's method all acid-fast bacilli are eliminated except tubercle and Johnë's bacilli.

The smegma bacillus is easily decolourised by sulphuric acid solution, after the slide has been treated for about one minute with absolute alcohol to get rid of the fatty material which surrounds this organism.

I thank you very much for the patient hearing you have given me, and hope that this short paper will promote a good discussion of this most interesting and important subject.

MICROSCOPIC EXAMINATIONS FOR T.B., 1921
(January—20th December).

Total No. of microscopic examinations	...	138
No. of microscopic positives ...	...	61
No. of microscopic negatives ...	...	77

Of the 77 microscopic negatives :—

11 biological positive.
46 biological negative.
10 awaiting biological result.
10 not sent for biological examination.

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Deducting from the total number of examinations made (*i.e.*, 138), the 10 milks awaiting the biological result and the 10 milks not sent for biological examination, there remain 118 milks from which definite results have been obtained. Sixty-one of these milks were proved positive by the microscopic examination and 57 negative. Of the 57 negative microscopic

results, 46 were confirmed in negative biologically and 11 returned positive. Thus 72 were proved definitely positive, and of this number 61 were found microscopically, or a percentage of 84·7.

The above figures include all milks examined, whether supplying city or not.

Discussion.

Major Abson, in opening the discussion, thanked Mr. Torrance very sincerely for both his paper and demonstration. He stated that the manipulation of the udder as mentioned in Mr. Torrance's paper seemed to be of great value, and he confessed that he had not done it in the thorough manner in which Mr. Torrance had been in the habit of doing. He would like Mr. Torrance to inform him how to differentiate between the two forms of tubercle bacilli, namely, human and bovine. He would also like to know whether the bacilli were more numerous in the first drawn milk or the strippings.

Mr. Hudson joined in the vote of thanks to Mr. Torrance, and would like to know whether the bacilli found in the tonsils of children were bovine and not human. If the former, he supposed it would necessarily follow that they were obtained from the consumption of milk. He also wished to know if there were any regulations which enforced the biological test in preference to the examination of the milk by the microscope.

Mr. Collinson drew attention to the fact that considerably greater numbers of bacilli were apparent in the smears treated by the anti-formin method, and would like to have the latter treatment more carefully explained.

Mr. Green apologised for coming late to the meeting, and would be obliged if Mr. Torrance would further describe his method of manipulating suspected udders.

Mr. Sampson explained that he generally manipulated the udder, using both hands, one being pushed up between the two halves of the udder and the other on the outside surface, well up between the udder and the thigh. He considered that by this method of manipulation, if there were any nodules in the udder tissue, they were almost certain to be discovered. He also drew attention to the fact that in tuberculosis of the udder the skin was not attached to the mammary tissue. He would like Mr. Torrance to state whether in his experience he found the animals' temperatures rise in cases of tuberculosis of the udder.

Mr. Smith explained his method of manipulating the udder, and stated that in his experience the cow with tuberculosis of the udder generally had a rise in temperature. He thought that in most cases the milk was poor, as seen by having a bluish tint.

Mr. Yates wished to express his thanks to Mr. Torrance for his demonstration and paper, which he stated went to prove the value of the veterinary inspector in protecting the public against tuberculous meat and milk. He, however, regretted to think that the public did not appreciate veterinary inspection as it ought to do, and wanted to know how it was possible to bring its value before the public.

Mr. Lloyd also spoke of the loose condition of the skin in tuberculosis of the udder, and stated that in the manipulation of the udder it was quite possible for an experienced veterinary inspector to be misled. He had met with cases of cold abscess which were very misleading, as in such cases there was a hard insensitive condition of the udder, which was like what was often met with in the parenchymatous type of tuberculous mastitis. He also mentioned cases where tuberculous udders at the time of inspection were under treatment by the owners, and owing to the repeated applications of strong liniments the skin had been rendered painful to the touch, and was apt to make the inspector think it was an ordinary case of catarrhal mastitis. Sampling the secretion from such udders usually demonstrated the fact that the disease present was not ordinary mastitis, as in the latter case the milk was usually materially altered in condition, whereas in tuberculous mastitis the milk, except in the later stages, was usually unaltered in appearance. He wished to impress upon the members present the great value of positive microscopic diagnosis of suspected milk as regarded saving time and money compared with that expended in the biological test. The results of the latter, as Mr. Torrance explained, usually took at least a month, whereas the microscopic result could be generally discovered in a few minutes. It was, however, necessary to remember that the non-discovery of tubercle bacilli in a suspected milk did not necessarily mean that the milk was non-infected, and in such cases to be quite certain it was necessary to resort to the biological test. In his opinion there was a great field for bacteriologists and pathologists in connection with diseases of the mammary glands in cows, as in many cases where cows were subject to "August" bag and post-parturient disorders of the udder, little was known of the exciting cause. As regards propaganda, or advertising the value of veterinary inspection, he thought when the Milk and Dairies Bill and the Tuberculosis Order were put into force the public would find that the only man qualified to carry out the work would be a veterinary surgeon. He had no hesitation in saying that better results would obtain from systematic inspection by thoroughly competent veterinary inspectors than would be obtained by the sampling of milk by sanitary inspectors and the biological test by bacteriologists.

Mr. Bowett added his thanks for the very instructive paper Mr. Torrance had delivered, and said that he greatly appreciated the practical demonstration. He would like to know what other *post-mortem* lesions were generally found to accompany tuberculosis of the udder, and how the udder became infected.

The Reply.

In reply to Major Abson's first question as to the differentiation between the two forms of tubercle bacilli, Mr. Torrance read the following extract from a paper on "Tuberculous Milk in Edinburgh; its Relation to Surgical Tuberculosis in Children," by A. P. Mitchell, Esq., Ch.M., M.D., F.R.C.S.

"The differences relied upon to distinguish a bovine bacillus from a human bacillus are based upon certain cultural characters and pathogenic properties. Thus, while the growth of the bovine on artificial culture media is scanty and slow, that of the human type is ready and luxuriant. The bovine tubercle bacillus produces in rabbits, within five weeks, an acute generalised tuberculosis, ending in death, from the intravenous injection of 0·01 or 0·1 mgm. of culture. With the human tubercle bacillus intravenously injected in the same doses the lesions are limited, usually confined to the lungs and kidneys, progress slowly, are almost never generalised and death seldom results.

"The two types cannot be distinguished from each other under the microscope, although the bovine type frequently shows short, thick, evenly and deeply staining forms, while the human bacillus is often longer, slender, curved, beaded and less deeply stained."

With regard to the question as to whether tubercle bacilli were more numerous in first drawn milk or the strippings, there were great differences of opinion, stated Mr. Torrance. He personally had never carried out any experiments to determine which milk contained the most bacilli, but he thought that in all probability the strippings would. Before commencing a clinical examination of the udders he waited until the cows had been milked out, if visiting in the evening, or else he visited early in the morning, so that the udders were practically empty, with the result that nearly all the samples he had taken were from the strippings, and the result of the microscopical examination of these samples had been so satisfactory that he thought a sample taken from the strippings most suitable for microscopic examination. Mr. Torrance stated, however, that one had to remember that the last milk was very rich in fat, with the result that when the sample was centrifugalised, the fat globules passing to the surface carried with them a certain number of tubercle bacilli. In Dèlèpine's method he took two loopfuls of cream and two of sediment, and treated them with equal quantities of alcohol and ether to get rid of the fat. As this method had not been practised there owing to lack of sufficient equipment, only the deposit had been examined, and better results would unquestionably have been obtained if Dèlèpine's method had been adopted.

In reply to Mr. Collinson, Mr. Torrance pointed out that by the anti-formin method, the field was so cleared up that the bacilli present on the slide were more easily detected. Anti-formin had a powerful disintegrative action on the tissues, so that the cells more or less coalesced, presenting, when stained, a light blue homogeneous film. The disadvantage of this method was that the cell structure was completely lost, and one obtained no indication of the kind of cells present. In examining a suspected milk that was a very great disadvantage, because by the type of cells present one could determine whether a milk was likely to be tuberculous or not.

In reply to Mr. Sampson, Mr. Torrance stated that he had never adopted his system of manipulating the udder, but that he was prepared to give it a trial and see if it helped him in detecting tuberculous udders. With regard to the second question there was no doubt that in tuberculous mastitis the skin was freely movable over the udder tissue, and one could say almost certainly that if the udder tissue was adhering to the skin the case was certainly not one of tuberculous mastitis. The question as to whether the temperature was raised in cases of tuberculosis of the udder or not was simply a matter of the extent of the infection in the body. If the animal was slightly affected, there was not likely to be any rise in temperature, such as one would get where there was tuberculosis of the mesenteric glands in the udder only; whereas in cases of generalised tuberculosis, miliary tuberculosis, or acute tuberculosis, the temperature was almost certain to be raised; so that so far as temperature was concerned it gave one no indication as to whether tuberculosis existed in the udder or not.

The question asked by Mr. Yates with regard to the education of the public to the importance of veterinary inspection for the detection of tuberculosis of the udder was a most important one. It was, however, too big a question to be answered then, but would form a very useful subject for a paper by one of the members.

In reply to the President, Mr. Torrance said that he would first of all deal with the question as to how the udder became infected.

This would to some extent explain the presence or absence of other lesions. He said that the udder might become infected in four different ways:—

(1) *By blood infection.*—From tubercle bacilli getting into the ordinary systemic flow and eventually resting in the udder.

(2) *By the lymphatic system from the mesenteric glands.*—This seemed to be a very common form of infection, and he had not seen a single case of tuberculosis of the udder where the mesenteric glands were not also affected. How the tubercle bacilli passed along the lymphatics from the mesenteric glands to the udder was a very difficult matter to explain. As the udder filled with milk and then became empty, that must produce oscillation of lymph in the lymph vessels, and it was quite possible that the bacilli in that way were drawn towards the udder. Although the lymph vessels contained valves, any bacilli which found themselves on these valves could grow through by simple continuity, and so would infect the next portion of lymph vessel nearer the udder beyond the valve.

(3) *By wound in the udder.*—That unquestionably had happened, but was extremely rare, and he had never seen a case of it. The most likely way in which that would be deduced was from an animal having tuberculosis in one quarter and the farmer milking that quarter on to the floor; if the animal received a wound in the neighbouring quarter and lay down, it was quite conceivable that that portion of the udder could become infected from the tubercle

bacilli on the floor. Infected fæces on the floor were another source of direct infection to the udder.

(4) *By way of the teat.*—Mr. Torrance said that he had never seen a case of this kind, but it was quite conceivable that it might happen under the conditions which he had just described.

With regard to the President's first question, Mr. Torrance stated that although he had never kept any statistics to show in what proportion other lesions occurred in tuberculosis of the udder, he had no hesitation in saying that in the great majority of them there was present tuberculosis of the abdomen and thorax; but the extent to which they were affected varied considerably, and in every case the mesenteric glands were involved. He did not think there would be more than seven to ten per cent. of cases in which the mesenteric glands of the udder alone were involved.

The Health of Men and Animals.

It was observed in many parts of the country during the recent influenza epidemic that domestic animals, and especially cats, developed a sickness resembling the human ailment. Many of the cats died, but so far as we know no efforts have been made to investigate the causes of death. It has often been remarked that during times of human affliction animals in contact with man tend to show signs of ill-health. The question naturally arises: Do the animals infect their owners or their owners the animals? A remarkable description of an attack of what, it is suggested, was encephalitis lethargica, popularly known as "Sleepy Sickness," in a dog has just been published in the *Medical Times*. This disease has also been reported among cats. There would appear to be an urgent need of the Institute of Comparative Pathology, for which Sir Clifford Allbutt has so long and so zealously striven. The study of animal diseases was one of the avenues to victory in tropical medicine. We are in no position to contend that its exploration may not yield results as considerable at home.—*The Times.*

Poultry Pathology.

"The study of the diseases of birds, so much neglected by our profession in the past, is," says the *Veterinary Journal*, "at last being forced upon us. All animals and birds, when sick, come into the legitimate sphere of the trained veterinarian, and it is up to us to be cognisant of their ailments and their remedies. Individual birds may be of comparatively little value and not worth attendance, but in certain districts large poultry farms exist and the aggregate values of their stock run into large sums of money—besides which there is the feeling that 'we ought to know.' The scientific treatment of all animal and bird diseases is a veterinary matter, and if we neglect it the distracted owner has a right to seek outside aid, and thus we lose an opportunity. Many of our lost opportunities are through our own fault, and in these days of revolutionised methods of practice and diminishing patients, nothing which legitimately belongs to us must be relinquished; the study of the diseases of the bird should occupy as honoured a place in our college curriculum as that of the diseases of any other of our legitimate patients."

Professor of Chemistry: "If anything should go wrong in this experiment, we and the laboratory with us might be blown sky high. Come closer, gentlemen, so that you may be better able to follow me."—*Journal of the American Medical Association.*

The Veterinary Record.

29th April, 1922.

SCHOLARSHIPS.

The attention of members who may have sons about to enter the profession may very wisely be directed to the advertisements which appear from time to time in our columns of the award of scholarships to enable students to attend a Veterinary College.

A few weeks ago we announced the examination to be held in September next for the award of the "Clement Stephenson Entrance Scholarship" tenable at the Royal Veterinary College, Camden Town. This scholarship, provided by the munificence of the late Dr. Clement Stephenson, is of a value of £80 per annum for four years. The subjects of examination are biology, chemistry and physics, which are subjects now taught in practically all good secondary schools. Applications should be made to the Secretary of the College not later than 31st August next.

In Scotland there are also Bursaries awarded under the Carnegie Trust to candidates of Scottish birth who have had two years' training in a school under the Scottish Education Department. These Bursaries cover the tuition fees at the Edinburgh and Glasgow Colleges. Application has to be made to the Secretary of the Carnegie Trust, 22 Hanover Street, Edinburgh.

In addition, many of the local education authorities in Scotland award Bursaries covering tuition fees, and even in some cases maintenance as well. Applications must be made to the offices of the Education Authority where the candidate resides.

In September next, moreover, there falls to be awarded the Commemoration Scholarship at the Royal (Dick) Veterinary College, Edinburgh. This scholarship was founded to commemorate the transfer of the College from Clyde Street to the new building at Summerhall. The scholarship is tenable for four sessions, and is of such value as will defray the ordinary tuition fees. There is no special examination for this scholarship, but application must be made on a special form and sent in to the Principal not later than the 1st September. The circumstances of the applicant, his school career, the nature of his preliminary certificate, are taken into consideration, and particular weight is attached to the candidate's general education and intellectual ability.

At Liverpool, prospective veterinary students may secure entrance scholarships on the results of the

Higher School Certificate Examination (July) of the Joint Matriculation Board. Applications must be made to the University.

Veterinary Students are also eligible for the Christopher Bushell Scholarship (£40 for three years) and the Bibby Scholarship (£20 for three years) also awarded on the Examination of the Joint Matriculation Board. The holders of the above scholarships are required to proceed to a degree.

The Liverpool City Council award scholarships to residents of Liverpool, including free admission and £40 per annum. Similar scholarships are awarded by the St. Helens and Wallasey County Boroughs.

There are also University Entrance Scholarships, enabling the holder to attend the degree course on payment of a commutation fee of £5 and a registration fee of £1.

Abstracts and Reviews.

Bureau of Animal Industry Investigations on Bovine Infectious Abortion.

This article is a survey of the most important facts revealed or confirmed by the extensive investigations which have been carried out for many years by the U.S.A. Bureau of Animal Industry.

The prime etiological factor of bovine infectious abortion is the *bacillus abortus* (Bang). This organism is an obligatory parasite, and it has been found that, in material discharged from the bodies of aborting cows, unless the circumstances are very favourable for its preservation, it generally dies in less than a month, and its death is greatly hastened by sunlight.

The bacillus occurs in the placentæ of aborting cows and in different portions of the bodies of aborted fœtuses. It is also found in the udders and milk of some infected cows. It may, in rare cases, persist in the uterus two months after an abortion or parturition, but, as a rule, it does not persist more than two or three weeks; it may persist in the udder and milk for greatly varying periods of time, from a few weeks to six or seven years. The udders of more than 60 per cent. of infected cows at some time harbour the bacillus, and when it is present in the udder it invades the uterus in a large proportion of cases during pregnancy, and may be very abundant, though the pregnancy is seemingly normal and ends in an apparently normal parturition. The organism occasionally attacks and can be found in the reproductive organs and seminal fluid of bulls, and it may be present in the stomach fluids, livers and gastro-hepatic lymph glands of newly-born viable calves. All attempts to locate the bacillus inside the animal body in situations other than those mentioned have failed.

It has been found that young cattle rarely harbour the bacilli in their bodies, and when they do they react to the abortion test. Many calves react to such tests during the first few weeks of their lives, but the reaction rapidly declines even if they are suckled by cows with infected udders. In general the results indicate that the calves of abortion-infected cows, whether they reacted or not to tests during the first few weeks of their lives and irrespective of whether they were suckled by cows with clean or infected udders, if protected against infection after weaning, are neither more nor less susceptible to abortion disease when they reach maturity than the calves of normal mothers.

The conclusion that the non-pregnant uterus is not a habitat of the abortion bacillus is based upon experiments which show that the organisms cannot be detected on uterine swabs for more than two or three weeks as a rule after abortion or parturition; that the organisms soon disappear from the uterus when cultures are injected; that *post-mortem* examination failed to reveal the presence of the bacilli anywhere in the thickness of the cotyledons or uterine wall, the Fallopian tubes or ovaries; and that no organisms were discovered in the uterus at œstral periods following copious intravenous injections of abortion bacilli.

Agglutination tests on 325 bulls sent to an abattoir for slaughter showed approximately 10 per cent. of reactors, and approximately 10 per cent. of the reacting bulls showed lesions of the reproductive organs from which abortion bacilli were isolated. It has been found that animals showing such lesions may expel abortion bacilli with their seminal fluid.

Modes of Dissemination. Bacilli may be expelled from the udder through the teat with the milk, from the uterus with aborted fœtuses, placentæ and discharges following an abortion or parturition, and from the bull with the seminal fluid and other discharges. That the bacillus may also be expelled with the alvine discharges of infected calves and of calves that drink infected milk seems probable, but has not been definitely proved.

Channels of Infection. The uninjured sexual cavities of non-pregnant cows do not serve the abortion bacillus as channels of entry, for it was found impossible to produce infection in such animals by intra-uterine injection of cultures of the bacillus or of placental material from cases of abortion, and similarly cows served by bulls whose semen contained the bacilli remained free from the disease. Ingestion seems to be the natural mode of entrance for the abortion bacillus into the bodies of its victims, and other conceivable natural modes of entrance, though they may not have been definitely disproved, have not experimental evidence to support them.

Tests for Abortion Disease. The agglutination and complement fixation tests are both equally reliable, but the former is the simpler, and is now generally used. The Bureau's results prove that if the udder of a cow harbours abortion bacilli the reaction will be positive in a dilution of 1 to 200 or more; in reactions obtained respectively with milk and blood serum from the same cow, though they may be equal, that of the serum usually is a little stronger; colostrum from infected cows often reacts in enormously high

dilutions; bulls which harbour abortion bacilli react positively. Although all matters relating to the test have not been so standardised that a satisfactory comparison can be made between the reactions obtained by different investigators, the Bureau is strongly inclined to the opinion that even a very low agglutinating property of blood serum for abortion bacilli should be viewed with suspicion.

Treatment and Prevention. Cows that have aborted or that do not clean properly should receive proper treatment such as the removal of dead and foreign material on which saprophytic and facultative pathogenic micro-organisms can feed and multiply, but such treatment should not include attempts to disinfect the uterine and vaginal cavities by irrigating them with strong germicidal solutions, because such attempts will prove futile and will result in further devitalisation of injured and diseased tissues.

Preventive treatment with abortion bacilli has been tried, using killed cultures among pregnant and living cultures among non-pregnant animals, and the conclusion arrived at is that the injection of living organisms prior to service confers a useful degree of immunity.

The author has noticed that an examination of the available *data* on the use of living cultures of abortion bacilli to produce immunity shows that the number of abortions among cattle that have received injections some time before conception drops with a noteworthy frequency to approximately 6 per cent., no matter what it may have been before immunisation was attempted, and this, coupled with the fact that a similar percentage of abortions was observed among a number of non-reacting animals, leads him to ask the question whether this is a figure which approximately indicates the number of abortions among cattle that are due to other causes than the Bang bacillus.

[SCHROEDER, E. C., *Journal of the A. V.M. A.*, 1922, Feb., Vol. lx., No. 5, pp. 542-561.] T. J. B.

Diseases of the Small Domestic Animals.

The author, in his preface, states "this book is intended to be a practical text on the Diseases of the Small Domestic Animals . . . it is primarily intended to be a book for student use and the busy practitioner."

As the title suggests, an enormous amount of ground is covered, and one can therefore expect no great detail in the description of any one disease.

The book is divided into fourteen chapters, each dealing with diseases met with in certain positions, undoubtedly an excellent arrangement and one well suited to meet the requirements of the practitioner.

For scientific reasons the metric system has been adopted throughout the text, and at the end of the volume is to be found a table of equivalents in weights and measures. By this means dosage can be readily determined in the other system if desired.

The subject matter is good, and great care has obviously been taken in its preparation. The book should have a good sale among practitioners, the author having attained his object in catering for the requirements of this class of reader.—G. W. D.

(DISEASES OF THE SMALL DOMESTIC ANIMALS, by Oscar Victor Brumley, V.S., Professor of Veterinary Surgery and Director of Clinics, College of Veterinary Medicine, Ohio State University, Columbus, Ohio. Lea and Febiger, Philadelphia and New York, 1921. Pp. 636. $4.75.)

Union Report.

The South African *Journal of the Department of Agriculture* for January contains the annual report of the Veterinary Division, wherein the principal Veterinary Officer (Mr. J. D. Borthwick) says:—

In spite of the efforts of the officers of this Division, the progress made during the twelve months ended 30th June, 1921, with the eradication of contagious animal diseases in the Union has not been so good as was anticipated. It is not wished to make excuses for the results of the work of this Division, but it is difficult to refrain from laying the blame where a great portion of it is due, *i.e.*, on the farmer. The Department draws up regulations and lays down a policy for dealing with the various proclaimed diseases, and does its utmost with the staff and funds at its disposal to see that they are carried out and adhered to, but unless it has the co-operation of the farmers it can never hope to have its efforts rewarded, even if a whole army of inspectors is employed. In a vast country like the Union the control of contagious diseases is a herculean task, but with the whole-hearted support of the stock-owner there is no reason why it should not be accomplished. The farmer does not realise his responsibilities to the country as a whole. It is not sufficient for him to carry out the regulations: it is his duty, in his own interests, to keep an eye on his neighbour and see that he does so too, for the precautions he takes will be practically nullified if his neighbour is negligent. It has been conclusively proved that dipping, if properly carried out, is the most efficacious means of preventing the spread of East Coast fever and controlling the disease. There can, therefore, be only one explanation of the spread of infection in areas where dipping is supposed to be carried out, *i.e.*, the farmers are complying with the letter of the law but not with the spirit. Their first dippings are conscientiously carried out, with the result that the deaths cease. Thus, lulled into a false sense of security, they do not pay so much attention to the dipping of the cattle; in fact, it becomes part of the routine work of the farm, such as ploughing, etc., and is often left to the natives, and the cattle are not properly submerged—some of them are not dipped at all—so that deaths commence to occur again. The Department, with the staff at its disposal, endeavours to supervise efficiently the dipping in the infected areas, but this is impossible in the clean areas; and it is in the latter areas that the co-operation of the farmers with the Department is specially needed. In one district in Natal, it is gratifying to state, a material offer of assistance has been made by the farmers and gratefully accepted by the Government. The example of the progressive farmers of this district, it is trusted, will be followed by many others.

In the course of the report on veterinary education and research it is stated that: "On the 1st of April, 1920, the Division of Veterinary Research commenced the new educational duties devolving upon it as a result of the establishment of a School of Veterinary Science. For many years past the necessity for training veterinarians in South Africa has been felt, and as the result of an arrangement made between the Department of Agriculture and the University of South Africa, provision has now been made for the establishment of a Faculty of Veterinary Science, forming an integral part of the Transvaal University College. The teaching staff is recruited from research officers of the Division, who hold dual appointments. The students thus have the benefit of being taught by professors who, as research officers, also are actually undertaking research work into the subjects they are teaching. Several appointments were made during the year, and the professional staff at the 30th June, 1921, comprised Sir Arnold Theiler, K.C.M.G., Director of Veterinary Education and Research, and Dean of the Faculty of Veterinary Science; Dr. P. J. du Toit, Sub-Director of Veterinary Education and Research, and Acting Dean of

the Faculty of Veterinary Science (Acting Director during Sir Arnold Theiler's absence); Dr. H. H. Green, Sub-Director of Veterinary Education and Research, and Professor of Bio-Chemistry; and eighteen senior research and other officers.

"On his appointment, Sir Arnold Theiler was forced to relinquish immediate control of the investigation work into lamziekte, and appointed Mr. D. T. Mitchell as his successor.

"Later on in the year several of the officers who received appointments on the teaching staff proceeded to Europe at their own expense to specialize further in the subjects that they would be called upon to teach and, at the same time, to attach themselves to a university with a view to undertaking special research work. Three officers received university recognition of their investigations, and the degree of Doctor of Science of the University of London was conferred on Mr. Andrews; Messrs. P. R. Viljoen and E. M. Robinson received the degree of Dr.Med.Vet. of the University of Berne.

"Towards the end of the year the heavy loss of stock in Zululand as a result of nagana rendered it imperative to give relief to the settlers, and a research station was established at Empangeni under the charge of Mr. H. H. Curson."

Sir Arnold Theiler left South Africa in September, 1920, on leave, and proceeded to Switzerland for the purpose of conducting special studies into various branches of veterinary science.

Faculty of Veterinary Science, Transvaal University College.—From the beginning of the current academic year, certain members of the staff were engaged on teaching work in connection with the Veterinary Faculty. Professor G. de Kock was appointed to the Chair of Veterinary Anatomy, and gave the full anatomy course to the second-year B.V.Sc. students. Mr. C. P. Neser, who was seconded to the Transvaal University College, continued his course in elementary veterinary science to the agricultural students and, in the absence of Professor W. H. Andrews, gave lectures on physiology to the second-year B.V.Sc. students.

Research Work.

Horse-sickness.—The preparation and issue of serum and virus for the inoculation of mules against horse-sickness was continued, and 2,847 mules were inoculated, with a mortality of 1·89 per cent. Apart from a few cases where death followed as a result of shock, the results could be considered as very satisfactory. The inoculation of mules in the districts is, however, always liable to be followed by a rather higher percentage of deaths than that following the inoculation at laboratories, as conditions in the field are rarely so satisfactory, and the class of mule to be handled is frequently unruly. The inoculation of private horses against horse-sickness was recommenced in January, 1921, but, in view of the experience of the last few years, it was decided to undertake the inoculation at Onderstepoort only. The influence of field conditions is even more marked in the case of horses than in mules, and as the technique is still somewhat complicated, and the inoculated animals require close supervision, satisfactory results can only be expected when the animals are stabled and kept under close supervision. From January until the end of June 567 horses were inoculated with a mortality due to horse-sickness of 23, or 4 per cent. Investigations into the cause of staggers in horses as a sequel to horse-sickness inoculation were continued, but no information has so far been gained to warrant an alteration in the theory held, namely, that staggers is probably due to a latent infection not connected with horse-sickness, but apt to develop and end fatally when such horses are subjected to the additional stress following inoculation against horse-sickness.

With a view to testing the immunity conferred on horses as a result of the experimental inoculation, a batch of 100 horses was exposed during the horse-sickness season on a farm near Kwambonambi in Zululand and another batch of a similar number on the farm Fascadale near Port Shepstone. In both batches deaths occurred, but in no case could horse-sickness be diagnosed, and although the opinion was expressed in some quarters that natural infection of the disease was not very serious in these areas, the neighbouring farmers, who were given an opportunity of buying the surviving horses at an auction sale, seemed undoubtedly to consider that the horses had withstood a good test. The experiment achieved a two-fold object, namely, first of all the immunity conveyed by inoculation held to the satisfaction of the farmers, and, secondly, the farmers were enabled to obtain possession of inoculated horses without the disadvantage of having to send their own horses to Pretoria for immunization.

During the whole of the year horse-sickness raged in a particularly virulent form in Griqualand West and surrounding districts. A careful study was made of this outbreak, and it was definitely proved by experiments that the disease was horse-sickness and nothing else. The epizootology of the outbreak presented various new and unexpected features. On many farms the way in which the disease spread was similar to that of very contagious diseases. Many observations pointed to the conclusion that mosquitoes were not the sole transmitters—probably not even the chief ones—of the disease in this case. This opinion was confirmed by the observation that on several farms very severe frosts were not able to check the outbreak. The matter is under further investigation.

Lamsiekte in Cattle.—Mr. D. T. Mitchell took over control of the experimental station at Armoedsvlakte after Sir Arnold Theiler assumed his new duties, and investigations into this disease, both in the field at Armoedsvlakte and in the Laboratory at Onderstepoort, have been energetically pursued. The main investigation was to continue experiments with various chemical products to ascertain whether a satisfactory substitute could be obtained for bone-meal. It has been fully established that bone-meal applied according to a definite programme undoubtedly prevents pica, but as the cost is rather high, the assistance of the Cape Explosive Works at Somerset West was sought to see if a cheaper and equally effective product could be prepared. Manuring experiments on a large scale were also carried out at Armoedsvlakte, and the results obtained so far seem to indicate that craving can be prevented if a grazing area is supplied with a fertilizer rich in phosphorus. It is, however, too early to say whether such a practice will prove more economical than the administration of bone-meal or a satisfactory substitute.

Arrangements were completed for a pica survey of the whole Union. This work is being undertaken in conjunction with the Botanical Survey Committee under the direction of Dr. Pole Evans. Six officers appointed by this Division have been distributed to various centres to carry out the details of the pica survey. In addition, they will undertake the collection of soil and pasture samples with the object of finally ascertaining whether pica is limited to any particular area. These surveys will naturally take some considerable time before final conclusions can be drawn, but it is anticipated that the information obtained will throw most valuable light on the incidence of pica and, as a result, on the prevalence of lamsiekte.

Gousiekte in Sheep.—The experiments at Kaalfontein, in the Pretoria District, that were undertaken through the assistance given by Mr. D. J. Strydom, and carried out in close collaboration with Dr. Pole Evans, definitely confirmed the earlier results that the cause of the disease was a plant known botanically as *Vangueria pygmaea*, or sand apple.

Contagious Abortion of Cattle.—The experiments indicated in the last report were continued and several field tests made with vaccine prepared at Onderstepoort. The issue of vaccine has been rather more liberal than in previous years, and good results have been obtained in many instances. All experiments confirmed the previous conclusions that a satisfactory immunity can only be depended upon by using live cultures as vaccine.

Slapsiekte or Dourine in Horses.—It would seem that this disease is spreading in certain parts of the Orange Free

State and in Griqualand West. Experimental research is still being undertaken, but no practical results have yet been obtained. It is hoped to carry out the serum diagnostic test for dourine in the near future. This would be of great help in locating new outbreaks of infection and thus prevent the spread of the disease.

Anthrax.—The experiments commenced some little while ago with a view to introducing a more effective vaccine for use in South Africa were brought to a successful conclusion in December, 1920, when the issue of the anthrax spore vaccine was commenced. As will be noted from the routine report, 636,728 doses were issued during the following six months, and the reports received since that date have been most encouraging. With each issue of vaccine a printed form was supplied, and the owner was asked to furnish particulars as to the results obtained. Although only about 5 per cent. of these forms were returned, the information obtained was most valuable, and it can safely be assumed that no untoward results occurred in the hands of the remaining 95 per cent. of farmers, otherwise the Division would undoubtedly have been notified. Reports of swellings following inoculation were of frequent occurrence during the first six to eight weeks, but whenever opportunity offered, an investigation was made on the farm concerned, and the conclusion was drawn that these swellings (which were rarely followed by fatal results) were most prevalent on farms where the infection was very heavy or where the inoculation had not been carried out strictly according to instructions. The anthrax spore vaccine, as originally issued, seemed to have one drawback in so far as cows in milk and working oxen were concerned. Several reports were received to the effect that milking cows showed a very marked decrease in the milk supply, and dairy-owners naturally felt that they had grounds for complaint. To overcome these difficulties a new vaccine was prepared for use on animals which the farmer did not wish to be subjected to unnecessary stress, and it is hoped to introduce this new vaccine in the near future. Towards the end of the financial year the general consensus of opinion throughout the Union was that the new spore vaccine undoubtedly checked outbreaks to a much greater extent than the original Pasteur vaccine, and there was every indication that the resulting immunity would be very much greater. Farmers have now become accustomed to these swellings, and regard them very much in the light of the dikkop frequently noticed in horse-sickness, in other words that the swellings in animals following the injection of spore vaccine is an indication that the animal has actually reacted to the inoculation, and as a result will be more resistant to natural infection than animals in which the swellings did not develop.

Redwater and Gall-sickness Vaccine.—Considerable difficulty was experienced in meeting demands for this vaccine owing to the extraordinary delay that occurred in obtaining suitable cattle from Europe. A period of eighteen months elapsed between the date of placing the indent and the arrival of the animals in South Africa, and in the meantime the strain was slowly dying out in the few available animals. At the beginning of 1921 the heifers arrived, and within two months the new strain was ready for issue and demands could be complied with in full.

Quarter-evil Vaccine.—During the past few years users of this vaccine had sometimes complained that it did not have the desired effect. Where possible, such cases were investigated, but as a rule it was found that the facts were exaggerated. It appeared that on some farms the disease was present in a most virulent form, so that the immunity produced by the ordinary strain of vaccine was too weak to check the outbreak. In such cases farmers were asked to send in a piece of the affected muscle from which a special strain was then prepared and a vaccine issued for the particular case. In all such instances the results were most encouraging. The great drawback to the present method is the insolubility of the vaccine powder in water, the result being that unless great care is taken at the time of injection, some animals receive more than the prescribed dose, and others less. With a view to overcoming this difficulty, experiments were commenced with the object of preparing a vaccine in liquid form. Good progress has been made, and it is hoped that in time this method will replace the older one.

Bloedpens in Sheep.—From time to time reports have been received of the damage done by a disease occurring amongst young lambs and known under the name of bloedpens. Several attempts had been made in earlier years to investigate this complaint, but without any definite results being obtained. This year, however, a research officer was specially detailed for this work, and the results of his investigations so far have been encouraging.

Pushing Disease in Cattle (Bovine Staggers).—The work on this disease, that was commenced in the previous year, was brought to a very satisfactory conclusion. A comprehensive report on the results of this investigation was presented by Mr. W. H. Andrews to the University of London as a thesis for his D.Sc. degree. The examiners commented very favourably on the quality of the work.

Snotsiekte.—This disease was fully investigated, and many points of interest cleared up. It was definitely established that the black wildebeest acts as a host for the virus. This disease is of considerable interest, as it bears a close resemblance to rinderpest in many respects. It is, however, of importance to know that snotsiekte is not contagious. It is most likely propagated by means of biting insects.

Styfsiekte in Cattle.—A few experiments on this disease were conducted on farms in the Transvaal, Cape, and Natal, and it was definitely shown that a ration of bone-meal given daily to the animals will prevent the disease.

East Coast Fever in Cattle.—In one series of experiments a large number of drugs were tried in the treatment of this disease; the results were practically negative.

A certain method of inoculation against East Coast fever that was advocated by a farmer in Natal, and received the support of a small section of farmers, was subjected to a series of tests. The results obtained proved beyond doubt that the method is an exceedingly dangerous one, as it causes the ticks to become infected and thus propagate the disease. These tests again prove that the present method adopted by the Government is the only sound basis for combating East Coast fever.

Toxic Plants.—The action of some of the toxic plants was more carefully studied, and it was found that even the dreaded "gift blaar" was entirely innocuous at certain seasons. It is not yet clear what the actual factors are that determine the toxicity of these plants.

Parasites in Sheep.—This group of diseases was further investigated during the year. The nodular worm of sheep received special consideration, and good progress has been made in the study of its life-history. It is anticipated that as soon as this is fully understood, methods of eradicating the disease can be worked out.

Miscellaneous.—Apart from the investigations quoted, which formed the major portion of the research work at the institute, a number of complaints were investigated, of which mention can be made of trypanosomiasis, spirochætosis of the pig, jagsiekte in sheep, krimpsiekte in sheep, and tick paralysis.

Association Reports.

North of Scotland V.M.A.

The half-yearly meeting of this Division was held in Marischal College, Aberdeen, on February 4th, 1922.

There were present:—Messrs. Wm. Anderson, Wm. Brown, D. Crabb, D. R. Crabb, R. E. Drennan, Geo. Howie, W. S. Lornie, A. Niven, Hugh McVean, A. McFarlane and Mr. Wallace.

Apologies for absence were received from Messrs. Robson, Cumming and Sievwright.

The minutes of last meeting, as they appeared in the *Record*, were adopted.

Mr. Alexander Niven, the retiring president, briefly thanked the members for their courtesy and kindness during his term of office, and said that it had been a great privilege and honour to occupy the chair. He hoped that the same respect, courtesy and good attendance at the meetings would be extended to his successor, Mr. Hugh McVean, whom he had great pleasure in introducing, and asking to now occupy the presidential chair.

Correspondence.—A letter from the Secretary of the Scottish Branch N.V.M.A., asking for permission to propose the President and Secretary of the North of Scotland Division as President and Secretary of the Scottish Branch, was placed before the members. After some discussion it was resolved to defer the decision on the matter until some further information regarding duties and responsibilities was obtained. Aberdeen being so far north, it was thought that members of other divisions would not be willing to travel so far from home to attend meetings. On the other hand, if the President and Secretary had to travel from their homes to meetings in Edinburgh or Glasgow, it would be too much of a tax on their time. It was ultimately left to Mr. Brown to get further information whilst on a visit to the South next week, and leave it to the President and Secretary to decide for themselves.

Re Royal Sanitary Institute meeting at Bournemouth.—It was resolved that no delegate be appointed this year.

Presidential Address.

Major McVean then delivered the following presidential address :—

Gentlemen,—I thank you for the honour you have done me in electing me as your President for the present year. I accept that office, not from any sense of fitness to fill the chair, but simply as a duty devolving upon me, and with your help I will carry out the duties to the best of my ability. I feel, somehow, that my task will be a light one, for I have the assistance of our able Secretary, Mr. Howie. I think you will all agree with me when I say that the success and the position our Society holds to-day is due to the energy and ability of our Secretary. Before proceeding further with the business of our meeting, you will wish to pass a cordial vote of thanks to our retiring President, Mr. Niven, for the manner in which he has conducted the business during the last year.

It is 18 years since I joined the North of Scotland Veterinary Association, and I have never regretted it, because I feel association with our fellows does good—broadens our views and lifts us out of the rut we are most liable to run in if left in isolation. He is a most capable fellow who has nothing to learn. I have always benefitted by our meetings—a friendly exchange of opinion, even a healthy criticism, if in good faith, does no harm. I think it is a duty incumbent on every member of our profession to support his local Society, for it is only by this unity that we can hope to maintain and improve our position. We are the only profession whose colleges are self supporting; we receive no grant from the State, but I feel convinced, if we combined our forces (and this can only be done by the individual practitioner supporting his Society, and through these Societies the National), that we can bring sufficient force to bear on our claims.

Consider what the profession has done for agriculture—the live stock of the country is almost free from any epidemic of contagious disease, which gives our stock an open market all over the world. It is to our credit that we have been able to prevent, after a great war, those diseases which were so common in the field from reaching our shores, when animals were migrating all over the world. But we have still one disease with us, and within the last few years becoming more prevalent. I refer to what is commonly called "grass sickness," or "grass poisoning." There are one or two bacteriologists who have spent time and money during the last year investigating this disease, but their work was handicapped through lack of funds. But this is surely a national question; and if the proper source were tapped, financial help might be given to investigate a disease which at the present time is fatal and becoming a serious loss to stock-owners. This research work is entirely outside the scope of the country practitioner. It is impossible for him to keep himself up to date in scientific knowledge, and also find time for research work. The Government has granted a large sum recently for agriculture and animal research, and, in my opinion, if we lodged our claim through the proper channel, sufficient funds might be obtained to equip a laboratory at one or two of our colleges, which would benefit the student and the practitioner alike. We have in our profession the men capable of carrying out the work; all that is required is the funds.

I am pleased to see that the Committee appointed by the Council of R.C.V.S. have recommended that a teacher be included on the Board of Examiners in the different subjects. This, I think, is only fair. It is difficult for two external examiners to form an opinion of a student's work during the session from a few written questions and a short oral. It is only just to the student that his record of work during the year should be taken into account, and that the examiners should have an opportunity of seeing it. Moreover, a nervous student will have more confidence in himself if his teacher is present.

I am all in favour of the one portal of entrance to our profession—this should be rigidly guarded.

In regard to the future of our profession, I am not pessimistic; but there is no getting away from the fact that the horse has been superseded to a great extent by the motor in our large cities. Our future lies in hard work and study and the solid support of our Societies, for only by this means can we hope, not only to maintain, but raise the status of our profession.

The disease I have already referred to—grass sickness—is becoming more prevalent in my district,

and up till now little can be done to alleviate its course or produce a cure. It is most common in the months of June, July, and August, and attacks the horse between the ages of two and seven, and occasionally an aged animal. I know of no condition of soil or climate which is most liable to it—it occurs on one or two year old grass or permanent pasture. I had one acute case this year on the heather and rough hill pasture. It does not attack the animals in one area. With the exception of two cases on one farm and three on another, all the others have been isolated.

The disease shows itself in two distinct forms—acute and subacute.

Symptoms of "Grass Disease."

The acute form is characterised by obstinate impaction of the large colon. The animal is dull and lying more than usual in the field; pulse slow and weak, respirations and temperature very little altered. I have never found the temperature above 102°, often 101°; the mucous membranes are injected, and frequently in the early stages there is a slight flow of saliva from the mouth. The abdomen is distended, and you can nearly always feel, on percussion through the abdominal wall, the distended colon well up on the flanks. On examination through the rectum the mucous membrane feels sticky and offers a fair amount of resistance to the entrance of the hand. A little hard, clay coloured fæces, coated with stringy mucous, is sometimes found, but oftener the rectum is empty and the large colon can be distinctly felt almost up to the brim of the pelvis as a solid hard mass, and quite different to the doughy feel of an ordinary impaction of this bowel. On several occasions I have tried to massage this mass, but the fingers make little or no impression on it. Another very constant symptom is muscular twitchings over the regions of the shoulder and thighs, especially if the animal has walked a short distance. There is a difficulty in swallowing, and in some cases the animal will attempt to eat and drink a few mouthfuls the first two days, but oftener refuses to take anything.

The disease runs a rapid course from this stage, and generally proves fatal about the third or fourth day. The abdomen becomes greatly distended; patches of perspiration all over the body; colicky pains; respiration increased; in some, a few hours before death, the animal evinces at intervals all the symptoms of choking—depresses the head almost to the breast, with spasm of the muscles of the neck, and emits a squeaking sound, which is immediately followed by a flow of saliva and ingesta through the nostrils. My first impression on seeing this symptom was that the stomach had ruptured or the animal had swallowed a mouthful of food some time previous to my arrival, and it had lodged about the glottis or œsophagus; but in each case the owners assured me the animals had touched nothing that day, and in every case upon which I have had the opportunity of making a *post-mortem*, I have not found the stomach ruptured. Is it not most probable that the mucous folds at the entrance to the stomach have become relaxed or paralysed, and that allows the act of vomition? This symptom is by no means constant.

The most characteristic symptom all through the disease is the complete stasis in the large colon.

Treatment is very unsatisfactory. Purgatives, nerve stimulants, alkalies and antiseptics have all been tried to stimulate the impacted colon without success.

Post-mortem.—In order to better understand the post-mortem appearances, I will detail the treatment of two cases I had on one farm. This outbreak occurred later on in the season than I ever experienced previously.

The first, a rising two-year-old Clydesdale filly, fell ill on the 26th September, with all the symptoms I have already described, except the symptoms of vomition. An ℥viii. alectic physic ball was given, followed every four hours with two quarts of linseed gruel, and in every second dose of gruel ℥i. of nucis vom. and ℥iij. sodii sal. were given. Hot fomentations to the abdomen were applied for twelve hours. Enemata are useless, although they were tried—they are immediately ejected. In twenty-four hours a quart of castor oil was given. I know this procedure is contra-indicated—to give a second dose of purgative within such a short period—but I have tried repeatedly to remove the obstructing mass with laxatives and stimulants without success. The linseed gruel was continued every four hours. This animal refused to take all fluids voluntarily. She died on the 30th.

All the organs looked healthy. Only in the alimentary tract were there any morbid changes to be seen, and these were conditions confined to the large colon. This portion of the bowel contained a very large quantity of dry impacted ingesta. So great was the amount that the bowel was very much distended, the lumen of the bowel being of at least half greater capacity than normal. The ingesta was particularly dry and packed, so that it gave one the impression that nothing that could be given medicinally would have any effect on it. Only in this position of the bowel was this condition seen. Anterior to it the ingesta was semi-solid. On examination of the bowel wall after removal of the ingesta and before being worked there was a considerable thickening of the mucous membrane, and adherent to it a considerable quantity of ingesta. After working in cold water the mucous membrane was found to be very much thickened and corrugated, and of a dull brick red colour, the whole appearance suggesting a state of prolonged stasis and not an inflammatory condition.

The second case, a four-year-old Clydesdale gelding, fell ill the same night (30th September). The treatment was similar, with the following exceptions, this animal receiving ℥viii. aloes, ℥i. aloin, ℥i. calomel, followed every twenty-four hours with a quart of castor oil. On the fourth day gave a hypodermic

injection of ℥i. arecoline hydrobrom. The animal died on the fourth day.

Post-mortem appearances were similar to the last case, only much smaller portion of the colon impacked; in every other part of the bowel the contents were fluid. I did not make a *post-mortem* on the third case.

Sub-Acute Form.—This form is characterised by great emaciation. The tissues of the body waste until the animal is a living skeleton.

The earliest symptoms.—The animal feeds and drinks sparingly, but with careful nursing and tempting food he may live for weeks, even months. The body begins to waste, patches of sweat on various parts—chiefly under the mane, tail, breast and shoulder, twitching of the muscles of the shoulders, thighs and nostrils; the abdominal muscles are tucked up (*this is a very constant symptom*). The bowels are irregular—constipated one day and purging the next; at times slight colicky pains. The respirations are deep and abdominal, and occasionally a cough is present. The pulse is weak and irregular; temperature about 102°. In June, 1920, I had a chestnut roadster gelding, four years, which went through all the stages and recovered, but that is the only case in my experience—he took over a year before the tucked up abdomen disappeared and he could eat and drink freely. The owner had a great fancy for him, and persisted in nursing him. He lived chiefly on milk, linseed gruel and green food when obtainable. He went greedily into the milk and green food, but a few mouthfuls satisfied him; his difficulty was in swallowing. I have no intention of expressing an opinion on the pathology of grass sickness, but I am satisfied on one point—that the disease is a nervous one. The paralysis of the bowel, the difficulty in swallowing, the twitching of the muscles, all point to some important nerve centre or centres being structurally altered.

Another disease which I have no doubt, when I describe the symptoms, will be familiar to you all, is one which I have never seen described in text books. It attacks the cow seven days to three weeks after calving, and shows itself in two distinct forms—acute and sub-acute; but in both you have a peculiar heavy sickly smell of the animal; in fact, you can smell her immediately on entering the byre. This smell is well marked in the milk and the breath. It occurs during the winter months. I cannot remember seeing a single case on the grass.

The cause is generally admitted to be retention and absorption into the blood of the second cleansings. For the acute form the animal gets suddenly excited, licks the wall or part of her body, grinds the teeth; eyes staring; a general stiffness of the body all over, with typical brain symptoms—she pushes forward into the manger, and finally collapses on her side, and lies in this position for a few minutes. The attack passes off as suddenly as it developed. The symptoms are not unlike acute lead poisoning or stomach staggers, with this difference—the peculiar smell of the animal and from her milk.

I had a case recently in a six-year-old cross cow in fat condition; she calved and cleansed naturally; her feed was turnips and straw. About a week after calving, the heavy sickly smell was detected in her milk, and on the tenth day she had her first nervous attack; these continued for a week, with one, two and sometimes three attacks in the twenty-four hours. After the attack she got to her feet, and, with the exception of being slightly dull, one would not have formed the opinion that there was much the matter. She fed and ruminated between the attacks and gave a fair quantity of milk; the temperature varied from normal to 103°; brownish discharge from the vulva, fæces dark in colour, constipated, and covered with mucous.

Treatment.—In this case I injected the udder as in milk fever with a solution of chinisol. My opinion is in these cases there is a toxic infection from the uterus, and by this channel a rapid entrance of the antiseptic is obtained into the system. I gave a full dose of purgative medicine, followed by sodii sal. and hyposulph. The vagina was douched out once daily with a solution of lysol. At the end of a week the attacks were becoming more frequent, and I had her destroyed.

Post-mortem.—All the organs were healthy, with the exception of the uterus, which was congested, and contained about a pint of thick, dark coffee-coloured liquid, but I could detect no smell in this fluid.

Sub-Acute Form.—This is much more common. Here again the first symptom is the sickly heavy smell of the animal and the discharges; she looks dull and listless, but in the early stages feeds fairly well. The bowels are constipated and encased in mucous; the appetite becomes less and rumination irregular, with loss of condition. Temperature very little altered.

Treatment.—A good dose of physic, followed by alkalies and tonics, gives temporary relief; the animal regains her appetite, but in my experience the disease recurs within a week or ten days as actively as ever. This continues in many cases until the animal gets on to the grass. In April last year I read an article in the *Veterinary Record*, by Mr. W. Brown, on this disease, and in the discussion on his paper the action of formalin was favourably commented upon—in fact, it was regarded almost as specific in its action.

I have had the opportunity in three cases this winter of trying the action of this drug and in every case with good results. Formalin, according to Findlay Dun, is a colourless liquid with a strong, pungent odour and neutral reaction, and is a powerful disinfectant, deodorant, and preservative. The active principle is "formaldehyde."

Formalin is a concentrated 35 per cent. to 40 per cent. watery solution of formaldehyde.

Messrs. Parke Davis refer to this drug as a most powerful antiseptic and deodorant. Professor Frost recommends it internally in cases of septic mammitis in ℥ss. doses in a quart of water. Bosshart, again,

is of the opinion that ℥ss. doses are too toxic for some cows.

The three cases to which I refer were given a full dose of opening medicine and followed with ℥iss. of formalin in a quart of cold water three times a day. Only in one case had I to repeat the treatment. The smell disappeared from the milk after a few days' treatment. I do not maintain that this drug is a specific in its action in these cases, but some practitioners maintain it is as decided in its action as the udder injection in milk fever. I have probably erred in giving small doses, but I would be glad if you could give it a trial and we could gather some definite statistics from its action.

DISCUSSION.

Mr. LORNIE: I have to congratulate Mr. McVean on the excellence of his address and the appropriate subjects he had chosen for discussion. I have seen few cases of grass disease and, like the President, have had no success in the treatment of it. I had one case in a horse which at one time looked very like the grass disease, but ultimately diagnosed it as dilatation of the œsophagus. This was confirmed on *post-mortem* examination. I cannot say that I recognise the cow trouble described by him, but, regarding formalin, I have used it very successfully in cases of diarrhœa and sepsis. I think it best to give formalin in saline solution.

Mr. BROWN wished to thank Mr. McVean for his very excellent address, which showed that he was up to date in the latest advances made by the profession. Regarding his description of the symptoms of grass disease, he had painted an exact picture of everything to be seen.

He could speak at length on this disease, as he had for years now been closely connected with the investigations into its cause and treatment, but his remarks were not for publication.

Mr. WALLACE: I think the cow trouble described by Mr. McVean is due to retention of the lochial discharges. We meet a large number of such cases, and find that the best treatment is to inflate the udder, irrigate the uterus, and give pot. iodide and formalin. The latter in one ounce doses three times a day.

Mr. ANDERSON: I beg to add my meed of praise to Mr. McVean for his very instructive paper. I think his description of the symptoms of grass disease most accurate. The distribution of the disease, to my mind, is most mysterious. For a disease to be due to an organism it is remarkable that it is not more widespread. Twelve years ago I had six horses and mares die on one farm in fourteen days. At the time the deaths were inexplicable, but in the light of recent investigations I have no hesitation in saying that this so-called grass disease was the cause of their deaths, as the symptoms exhibited were identical with those cases we now get every year. It is a remarkable fact that on this farm there has never been another case. There is no treatment for this disease; a few will struggle through with careful nursing, but they are seldom of any use afterwards.

Regarding the cow case, I do not think the lochial discharges have anything to do with it. It is simply indigestion, and I think the formalin treatment proves that.

Mr. CRABB: I beg to thank Mr. McVean for his address. I am very glad to say I have never seen this grass disease, nor can I recognise his cow case—especially the smell of the animal and of the milk.

Mr. NIVEN: Mr. McVean has shown great wisdom in his choice of subjects for his address, and he has treated them in a masterly manner. I also am fortunate in not having seen a case of grass disease.

The nearest to his cow case is one I had where the cow had constipation of the bowels and was continually licking the walls. Regarding formalin, I have used it successfully in chronic tympany in cattle.

Mr. D. R. CRABB: I have never seen grass disease, but would like to see a case. I think I would be able to diagnose one if I saw it from your very excellent description. I had a case in a cow where the milk smelt of hemlock. She got better, but it recurred at intervals.

Mr. DRENNAN: I have had quite a number of cases of grass sickness. Your description is absolutely clear and accurate. I had a case in an old pony in town (not on grass). It was coughing; I gave it some linseed oil. Next day the animal was salivating and regurgitating; muscles quivering; and it showed all the other classic symptoms of grass disease. I have had no success in treatment.

I am inclined to agree with Mr. Anderson in the cow case, and regard it as indigestion. If hysterical, inflate the udder and irrigate the uterus and give anodynes. This treatment is usually successful, but the trouble is apt to recur, in which case I give pot. iodide in ℥ss. doses three times a day. This is successful in most cases. I have never tried formalin in such cases, but I mean to do so, and if it is successful, it will be another step up the ladder.

Mr. HOWIE: I had my first experience of grass disease last summer, when I had three cases, two of them on one farm. I was absolutely puzzled with the first case. After I had it on hand a week, I met Mr. McVean, and from his description of the disease, I soon found that I had it, too. This case was destroyed in ten days after attack. The second case was acute and died on the third day. The third case lived on for a couple of months, when it got down and had to be shot.

Regarding the use of formalin, it is a drug which is too little used in our profession. It is almost a specific in most cases of sepsis of the uterus. It can be given in ℥i. doses twice or three times a day, but it must be largely diluted with water. One ounce doses should never be given in less than two quarts of water. I can endorse what Mr. Niven says as to its value in chronic tympany in cattle.

Major MCVEAN, in replying, said: We have had a most excellent discussion, and I thank you all, gentlemen, for your appreciation of my humble effort. I have to thank Mr. Brown especially for his information, and am glad to hear that there are good hopes of obtaining a prophylactic.

The next item on the agenda was the deferred discussion on Mr. Lornie's paper on "The Chlorination Treatment for Mange."

Mr. LORNIE: I do not think, gentlemen, there is anything to discuss. The paper was prepared partly to fill a gap, and partly for the purpose of putting the work on the subject in Egypt on record. The system is only possible where great numbers have to be treated and would be of no value in country districts, where isolated outbreaks have to be dealt with.

Mr. MCVEAN said he would like to move a vote of thanks to Mr. Lornie for his paper. He had also had great experience of mange in Salonica and France during the war. In the former place the facilities for treatment were very meagre, but in France they had great success with calcium sulphide baths. In the east it was a remarkable fact that mange always first broke out under the jaws, where the rays of the sun did not strike.

Mr. BROWN seconded, and Mr. Lornie was accorded a hearty vote of thanks.

Mr. BROWN made himself responsible for the subject of discussion for next meeting.

The business having been concluded, the President was thanked for his conduct in the chair.

GEORGE HOWIE, *Hon. Secretary.*

Lancashire Veterinary Medical Association.

MASTITIS IN THE COW.

(*Continued.*)

MR. J. HOLROYD, in continuation of his remarks on the etiology of mastitis, said:

The ways by which teat infection occurs are very numerous, the commonest being :—

(1) Contamination from the floor or bedding. A common practice is to milk a diseased quarter direct on to the floor instead of in a pail. A cow with retention of the placenta is also a source of danger of floor contamination.

(2) The use of teat syphons and bougies. Be as careful as one may one occasionally gets mastitis following the inflation of the udder in milk fever cases.

(3) External wounds or abrasions, especially those encircling the orifice, where the milker has to remove the scab before the milk can be drawn, frequently give rise to cases of mastitis.

(4) Infection carried by the hands of the milker.

(5) Do flies carry infection ? I have several farmers who are troubled with mastitis who smear the teats of their dry cows with tar several times a week, but still the cases of mastitis do not decrease in number.

The cases of non-tuberculous mastitis which we put down as being due to blood infection are those that offer the most difficulty as to their true etiology. It is supposed that the organisms are picked up from the intestines, lungs, or uterus or, may be, other infective seats, and carried by the blood stream till they reach the udder, which organ appears to be a suitable habitat for their growth. One can understand cases where we know we have a bacterial infection in some part of the body, but what about those cases which appear spontaneously ?

I find a great number of dry cows become affected, especially in the months of July and August. The best cows on rich pastures appear to be most prone to the disease and have it in the most virulent form. Animals which appear to be in the best of health one day are found with a severe acute mastitis the next. By what method have these become infected ? It hardly looks like teat infection, taking into consideration that there are no teat lesions and the animals are at the time out in the field both day and night and never enter a building. If it is due to blood infection, from where have the organisms come ?

The organisms which are found in udders affected with mastitis are very numerous, but in each case it is supposed that we have a simple infection at the commencement and later a mixed infection due to secondary contamination.

The most common organisms are :—(1) ***Staphylococci ;*** (2) ***Streptococci ;*** (3) ***B. coli ;*** (4) ***B. pyogenes ;*** (5) ***B. tuberculosis ;*** (6) ***Actinomycoses.***

We have recently heard of Bang's bacillus of contagious abortion being present in the udder, but whether or not it causes mastitis in certain cases I am not prepared to say. One often meets with a case of mastitis in an animal that has recently aborted, and it makes one wonder whether or not Bang's bacillus is guilty.

I am afraid it is beyond us to distinguish clinically the different lesions produced by the different organisms, with the exception of the lesions produced by the tubercle bacillus.

Symptoms—Acute Mastitis.

In the mildest of cases we get little or no constitutional disturbance, the only alteration being in the udder and a changed condition of the milk. We find one quarter slightly swollen, slightly painful, and the milk when drawn from the affected quarter is slightly coagulated or watery. In these cases recovery is generally complete in from seven to fourteen days. In more severe cases we get great constitutional disturbances, loss of appetite, elevated temperature (frequently 105° or 106°), and in odd cases up to as high as 108°, hurried respirations, quickened pulse, cessation of rumination, loss of milk in non-affected quarters, and in cases where the quarter shows considerable enlargement the animal abducts the hind leg of the affected side in order to relieve pressure on the quarter. In some of the most severe cases the animal has a disinclination to stand and if made to rise soon resumes the recumbent position, and I may here say that we look upon this symptom as an unfavourable one.

The affected quarter is swollen, hot and painful, and the teat in many cases is affected in the same way as the quarter, and in some of the cases due to teat infection one can feel the milk duct in the teat thickened.

The swelling frequently extends forwards under the abdomen if it is a fore-quarter that is affected, or upwards and backwards to the perineal region if it is a hind-quarter ; this is also an unfavourable symptom. Swelling of the hind legs chiefly about the hocks is a common complication.

If these cases take a favourable course the severe constitutional disturbances subside gradually after about the second day and the udder lesions begin to improve after four or five days leaving the affected quarter enlarged and incapable of milk production. After a lengthy period the quarter gradually shrinks and remains functionless.

In odd cases at the time of the next calving an old mastitis quarter will swell up again, due I think to a physiological congestion rather than to an acute re-infection. Abscess formation is a common occurrence in cases of acute mastitis.

Gangrenous mastitis is an acute form of mastitis and may affect the whole or only a portion of a quarter. The inflammation is so severe as to cause an arrest of the blood supply with consequent death of the tissues involved. In gangrene we get more severe constitutional disturbances than I have mentioned previously, the animal is duller, the breathing is shallow, temperature often normal or subnormal, semi-comatosis and death is not infrequent.

The secretion drawn from the teat is of a dark red colour, often clear and of watery consistence, and has a most offensive smell, the udder or the teat if it alone is affected is tense, shining and of a reddish violet colour, and after about 12 to 24 hours becomes cold.

In some cases of gangrenous mastitis we get only a portion of the internal structures of the quarter gangrenous, the teat and skin of the udder remaining quite normal. In these cases we have the offensive smelling red coloured secretion, perhaps not so clear as in cases of gangrene of the whole quarter, with a certain amount of gas production in the quarter which is discernable through the skin by palpation and also is drawn out of way of the teat. These cases terminate by sloughing and the diseased portion comes away through the orifice thus made, leaving a deep cavity which usually heals with time. Although in cases of gangrenous mastitis of the whole quarter death is most frequent, there are many cases which make a good recovery after the quarter has completely sloughed away.

Chronic Mastitis.

Excluding tuberculosis and those cases of acute mastitis which by length of time and partial recovery have become chronic, I do not think we find many cases of chronic mastitis, and if we do come across a case we have great difficulty in differentiating it from tuberculosis. In non-tuberculous chronic mastitis we find nodules in the substance of the udder and a gradual change from milk secretion to a secretion of a purulent character. There are no constitutional disturbances.

Tuberculous mastitis is in the great majority of cases due to blood infection, and the lesions produced are in the stroma. The posterior quarters are more frequently affected than the anterior ones and usually only one quarter is affected. If the disease has been in existence some time we get two, three, or in some cases all four quarters affected. The disease manifests itself more often in the upper portion than in the lower, if in the lower portion the favourite seat appears to be round the base of the teat. The enlargement is hard, firm, and painless, and lies embedded in the structure of the quarter, the overlying skin being quite free. At first the milk shows no alteration in character, but as the disease advances the milk becomes altered, usually becoming more watery, coagulated and purulent in some cases, and may be in odd cases slightly tinged with blood.

The supramammary lymphatic gland is also frequently enlarged, but owing to its situation, and to the fact that the

glands on each side are in the same condition, it is not of great diagnostic value.

In advanced cases the quarter is much enlarged and irregular knotty hard tumours can be felt throughout its substance. The presence of acid-fast bacilli in the milk is of great importance in coming to a satisfactory diagnosis.

Actinomycosis of the udder is another chronic form of disease, but I think it is rare, I have never come across a case, and we have had during recent years a large increase in the number of cases of actinomycosis. The lesions produced are very similar to tuberculous lesions, but the nodules are more numerous.

Treatment. In the acute stages of the disease treatment must be general, internal, and local.

General treatment consists in good hygienic conditions, cleanliness, warm clothing, an abundance of air, and suitable food.

Internal treatment: In the initial stages an animal which is in good condition should receive a brisk cathartic combined with febrifuges, followed by internal antiseptics and febrifuges, the best of which I find to be 40 per cent. formalin in ʒii.-ʒiv. doses two or three times a day, pot. nit., soda salicylas, camphor, and, in cases where pain is excessive, a combination of these with opiates is indicated. In cases where we have a normal or sub-normal temperature I substitute diffusible stimulants (such as spts. æther. nit., spts. ammon. aromat.) for the febrifuges.

After the acute constitutional disturbances have passed away internal medication seems to do little good.

Up to the present I have not found any beneficial results from the use of vaccines, but I have only used stock vaccines such as anti-suppurine—anti-streptocene. Perhaps if we used an autogenous vaccine better results would follow; may be some members present will give us the benefit of their experience if they have had any satisfactory results from the use of vaccine treatment.

Local treatment: The most important and essential local treatment I consider to be the continual stripping out of the affected quarter. In early cases I like this to be done at least every two hours, so that any secretion formed is withdrawn practically as soon as it comes down into the milk sinus.

Hot fomentations (or steaming) are beneficial in relieving pain, afterwards rubbing the quarter with an emollient liniment such as camphorated oil to which some anodyne is added if the pain is excessive.

I am not in favour of the injection of antiseptic fluids.

In acute cases, when it is impossible to draw out the secretion by way of the teat and when quick relief is necessary, cut off the teat about its middle or open it up lengthways, afterwards plugging with antiseptics and thereafter frequent removal and re-dressing.

Abscess formations in the quarter should not be opened too early, as frequently we get severe hæmorrhage from the walls of the udder which is not always easy to control.

We can do very little in the way of treatment for cases of chronic mastitis. Absorbents are indicated, such as iodine preparations, oleate of mercury, or a mild blister of biniodid of mercury, but in most cases treatment is of no avail and the disease progresses.

Discussion.

Lieut.-Col. J. W. Brittlebank, C.M.G., M.R.C.V.S., who opened the discussion, said: I must first thank Mr. Holroyd for his interesting paper. I hope that he will come often, and personally the question which he has raised this evening is one of such extraordinary importance to the profession that I feel we can do little justice to it in the short time at our disposal.

Those of us who are concerned with public health are more specially interested in the more particular disease, such as tuberculous mastitis, which is a menace to public health. How far ordinary mastitis may be a menace to public health we do not know. It is true that an udder affected in one quarter with mastitis is not as a rule deliberately milked into the remainder of the milk, but it is also true it is impossible to milk the remaining quarters without introducing some of the infection. Apart from that, our interest from a veterinary point of view is far greater than from the stock-owner's point of view. It is impossible to estimate the incidence of loss on dairying from ordinary mastitis to-day. I have tried from time to time to ascertain what mastitis really is. I agree with Mr. Holroyd when he says it is acute, but when he says *de novo* it is inclined to be chronic, I am not inclined to agree with him.

It is no use talking about treatment until we know what are the particular causes at work in producing this particular disease. I am of opinion that we have two forms of mastitis, one due to bacterial infection, and another probably due to some other cause, probably dietetic or chemical. The acute mastitis as we meet with it has been most admirably described by Mr. Holroyd; the distress, the alteration in the character of the milk, and the pain experienced by the animal, but these conditions are produced, curiously, as a rule in one quarter only, I think more usually in a hind-quarter, which would lead one to suppose that injury may have played some part in the causation of the disease. To-day, I am afraid, injury plays but little part in the causation of mastitis. We have from time to time various forms of acute mastitis. Are they seasonal? We have also from time to time epidemics of mastitis which are extremely difficult to treat, which become rapidly septic, and in many cases gangrenous, with the death of the animal not infrequently taking place. What is the cause of these conditions? This is a point to which as a profession we have got to address ourselves. Take for instance, other infection; such as abscesses, to which there is probably but very little exciting cause. Are they subsequent or primary to the disease? My own supposition at the moment is that only in a few cases are they primary to the diseases but so complicated is the anatomy of the udder that we have to look first of all to the peculiar construction of an udder. Is it not probable or possible that we have certain small chemical changes going on in the acini with a consequent blocking of the ducts? I hesitate to lay anything down as a *dictum*. Have we not a condition in the udder of cows which very closely resembles lymphangitis of the horse? Have we not got an organ which may be particularly subject to attacks of inflammation of the lymphatics? In my mind, in the somewhat numerous cases of mastitis I have seen, I am very strongly of opinion that we have both conditions.

Mr. Holroyd speaks of mastitis as he meets it in the field. Can we save the quarter, can we make that quarter milk-producing, or has it got to be lost? In about 90 per cent. of the cases the quarter becomes lost, but in a number of these cases we have these quarters giving quantities of pus through the teat almost indefinitely, at any rate they disappear from our ken in the ordinary course. I confess that the more I see of mastitis, the more confused I am about the causes.

Mr. Holroyd has mentioned the fly. There I am prepared to express a fairly definite opinion. I think undoubtedly the fly plays a very considerable part in the production of specific mastitis. We know perfectly well in the summer months of the year how at the end of milking, having in view the cup-shaped end of a teat, however careful the milker may be there is a drop of milk left at the teat. Flies congregate over a drop of milk, and it has been shown that organisms travel up a teat, and in such a way general infection can be diffused throughout a quarter; but why is it in these cases as a rule it is only one or two quarters? It is equally true in my experience that if such attacks of mastitis do break out at such times of the year, that if precautions are taken mastitis can be limited within fairly reasonable limits.

External wounds and abrasions I leave as being too obvious to discuss.

Blood infection: Is it probable that we have a discharge of organisms into the blood which finally locate them-

selves in one of the quarters? It is quite true that a quarter having suffered some injury will lend itself to such a blood-laden infection, but it cannot happen in every case, and I am not yet ready to say that there is a *coli* infection. It tends to follow that one could dismiss the question of blood infection, but at the moment it suggests that the discharge of organisms from the body which would be more probably organisms of the *coli* group, do not play any considerable part in primary infections of mastitis.

I found myself in a considerable difficulty when trying to elaborate Mr. Holroyd's very concise and practical remarks which he has put before us. The main point at issue from the practising veterinarian's point of view was as to treatment of the common form of mastitis. I have made many careful observations on treatment as applied by different people and as the outcome of my experience, and so far as my opinion may be worth anything, I would venture to differ from the essayist, as in my experience the administration of a sharp saline purgative is bad practice. I prefer to give antacids such as sod. bicarb., or pot. bicarb. in large doses, and followed by quinine, directing my main attention to the affected quarter more particularly, and here I recommend and use continuous hot applications either applied with hot water direct or in the shape of poultices. By continuous I mean unremitting attention for at least 12 hours, and in some cases it may be 24 hours, followed by painting the affected gland with liniment of belladonna. I admit that the treatment is difficult to carry out, but in my hands it has yielded far better results than any other which I have tried. In one large herd, which has been under my direct control, I have had excellent results and the percentage of quarters returned to active secretion has been very high.

I may say that I have tried vaccines and I have also tried irrigation with various liquids and I was inclined to think at one time that the latter method held out high hopes of success, but if it is to be practised it can only be properly done by the veterinary surgeon and here the economic question enters very largely.

(To be continued).

Notes and News.

The Advisory Committee's Report.

The following appeared in the correspondence columns of the *British Medical Journal* of April 8th:—

COMPARATIVE PATHOLOGY.

Sir,—The perusal of your leader in the issue of March 25th, 1922, in which some of the recommendations contained in the Report of the Advisory Committee on Research into the Diseases in Animals are reviewed, urges me to refer to the work of the University of Liverpool in this subject.

In 1896 a medical graduate of this university, H. E. Annett, M.D., D.P.H., was awarded an 1851 Exhibition Scholarship and engaged in research at London and Berlin during 1897-99 on "the relationship of diseases of animals to those of man." Subsequently, during his association with the Liverpool School of Tropical Medicine, diseases of animals in tropical and sub-tropical countries were investigated. In 1904 Dr. Annett was appointed Lecturer in Comparative Pathology in the University of Liverpool with special laboratory accommodation, and Superintendent of the Farm Station of the Institute of Comparative Pathology (affiliated with the university) at Runcorn. From this nucleus the School of Veterinary Science in the university evolved, and in this school in 1906 the Lectureship in Comparative Pathology was elevated to a chair. After five years, however, owing to lack of permanent endowment, the chair lapsed.

During the last ten years Dr. Annett has continued, as opportunity permitted, to maintain interest in this subject at the Runcorn Research Laboratories, and is at present engaged in similar research work in the university.—I am, etc., R. E. KELLY, Dean of the Faculty of Medicine.

University of Liverpool,
April 3rd.

ZOOLOGICAL SOCIETY REPORT.

The annual report of the Zoological Society of London for the year 1921 states that the Society is recovering from the effects of the war in all its departments. The interesting announcement is made that the Council are engaged in working out the plans for an aquarium to contain both marine and fresh-water creatures. The site selected is under the Mappin Terraces, provision having been made for the purpose in the original design. It is expected that the aquarium will be as well equipped as any in the world. At present there is no first-rate public aquarium in Great Britain.

The total number of visitors during the year was 1,386,745, nearly 200,000 less than the previous year, with a consequent reduction in the income from gate-money. On the other hand, the income from the subscriptions of Fellows was over £13,000, and was the largest in the history of the Society. The numbers of mammals, reptiles, and birds were larger than in the two previous years. An American and a European bison, a black buck, two nylghaie antelopes, seven ibex, one thar, four Barbary sheep, three muntjak, one axis deer, eight porcupines, two hyraxes, two agoutis, and one Malay tapir were among the mammals bred and reared in the gardens. No fewer than 41 species were exhibited for the first time.

The library received many valuable acquisitions, and the Society's own scientific publications have regained almost their normal size. The Prosectorium, in which anatomical and pathological work is carried out on the bodies of animals that have died in the collection, was reconstituted. In addition to researches conducted by the staff, material was sent to the British Museum, Lord Rothschild's museum at Tring, the Royal College of Surgeons, the National Museum of Wales, and to many university and private workers.

Exportation of Horses.

In reply to questions asked in the House of Commons as to the export trade in live horses with the Continent, the Minister has made it clear that only those horses which are in good working condition are allowed to be exported. The elimination of the unfit or worn-out horse has been effected, and there would be no justification for interfering with the export of the horses that are now being shipped, on the ground that they may ultimately be slaughtered for food.

Going into some detail, the Minister said that he had repeatedly stated that the system of veterinary inspection of horses exported to the Continent had been entirely reorganised in the spring of 1921, and that no horses are allowed to be shipped unless they come fully up to the standard laid down by the Exportation of Horses Acts, 1910 and 1914, namely, fit to travel and fit to work. The average weekly exportation of these horses to Holland and Belgium in the period from 1st October, 1921, to the end of February, 1922, was approximately 300 (at the beginning of that period and earlier in 1921, it was more usually about 1,100 a week, so that it is clear that the change in the regulations has effected a change in the traffic; worn-out horses for food being sent over as carcases rather than alive). The Minister also stated that no relaxation of the high standard of inspection had been, or would be, allowed, and that the present conditions ensured that the animals were conveyed without avoidable suffering.

In amplification of these statements, it may be mentioned that a whole-time Superintending Veterinary Inspector

supervises the traffic, and not only watches the work of the examining Inspectors at the ports, but also, unknown to them, meets some of the vessels at Antwerp, etc., in order to observe the condition of the horses on disembarkation. He reports that the required standard is being properly maintained, and this is corroborated by the Belgian officials and by the Societies for the Prevention of Cruelty to Animals in Holland and Belgium.

Stringent regulations as to feeding and watering of horses before and during the sea-passage, and as to the fittings of vessels used for the carriage of the animals, are laid down in the Exportation and Transit of Horses Order of 1921. A daily ration for horses of different types is prescribed, and all vessels are required to carry a surplus of at least a day's ration for each horse on board, in case of emergency. The port inspectors go on board and see that the necessary provision of food and water is made and that suitable receptacles are available to enable the animals to obtain it.

There can be little doubt that many of the statements recently made in the Press as to this traffic refer to conditions which no longer exist, having been finally brought to a conclusion by the measures taken by the Minister in the spring of last year.—*Ministry of Agriculture and Fisheries.*

Foot-and-Mouth Disease.

In spite of the setback received by the outbreak which occurred on Wednesday, the 12th, at Shirley, near Birmingham, in an area not previously infected, the elimination of the disease continues to make good progress. During the week ending Monday, six outbreaks were confirmed.

The 30 cattle and 81 pigs comprising the affected stock and "contacts" in the Shirley outbreak were slaughtered, and a district with a radius of fifteen miles from Tanworth, including Birmingham, Stratford-on-Avon, Alcester, Bromsgrove, Dudley, Coventry, and Warwick, has been scheduled under a Ministry Order.

Fresh outbreaks were also confirmed at Newcastle involving a valuable herd of dairy cattle, and at Whitkirk, Salop.

London's Fine Vanners.

A large crowd of holiday-makers assembled in Regent's Park to watch the 14th annual parade of the London Van Horse Society. Last year the number of horses on parade was 672, an increase of over 200 compared with 1920; but on this occasion, despite the growing competition of mechanical traction, there were 557 single entries and 141 pairs, representing 839 horses. Not only was the number of entries larger than it has been since 1914, but the quality and condition of the horses were more noticeable than in recent years. Only three of them failed to pass the preliminary examination of the veterinary inspectors, thus showing the success of the society in its chief aim of improving the street horses of London.

After the veterinary inspection the exhibits were driven past the stand, at the entrance to the Botanical Gardens, where the parade was witnessed by the Lady Mayoress, who was accompanied by the Lord Mayor (Sir John Baddeley), and where the judging took place. The cleanliness of the horse, the vehicle and the harness were the points the judges had to consider; and in these points all the exhibits were considered by them to be highly satisfactory. No fewer than 495 first-class awards, to which small money prizes were attached, were given; and so meritorious were the whole of the entries that only three exhibits fell into the third division.

Among the firms represented were: James Buchanan and Co., Carter, Paterson and Co., Price and Co., Sterilized Milk Company, Great Northern, Great Central, and Great Eastern Railway Companies, W. H. Smith and Sons, the Aerated Bread Company, Pickford's, Lyons, Schweppes, and Hays Wharf Company.

The judges included Sir Gilbert Greenall, Sir George Hastings, Brigadier-General A. B. Helyar, Colonel Charles Norton, Lieutenant-Colonel P. R. Laurie (Assistant Commissioner of Metropolitan Police), Major Tanner (Army Remounts), Mr. James Ellis, Mr. John H. Dyer, Mr. Frank Ward, Mr. C. B. Toms, and Mr. G. B. Manley.

After the parade, and distribution of awards by the Lady Mayoress, Sir Gilbert Greenall presided at luncheon, at which the Lord Mayor and Lady Mayoress were present.

In proposing the toast of the society, the Lord Mayor said that was the first time the Lord Mayor of London had been asked to be present at the parade. He was astonished to see so many horses and vehicles; and he did not think that motor transport would, after all, lead to the extinction of the horse. He thought that the object of the society in getting men to look well after their animals had been very successful.

The Chairman, replying, said it was perfectly astonishing after all they had heard about motor transport to witness the show the society had had. There was no doubt the society had done an immense amount of good for the working horses of London. It had had a great influence on the men; and the masters had also done much in furthering it.—*The Times.*

Dyeing Dogs in Paris.

Reports from Paris indicate that many women are having their pet dogs dyed a tint to match the gowns they wear.

The blonde, henna, rust and brown shades are easily accomplished, as coats of both Chows and Pekes responded well to the usual peroxide and henna treatments, but some difficulty has been experienced in securing matching lavender dachshunds and purple Pomeranians.

The fashion has been further complicated by disinclination to use German dyes on French dogs.

What the Horse Did in the War.

Lecturing in Greenhead Halls, Bridgeton, Glasgow, under the auspices of the Glasgow and West of Scotland S.P.C.A., Professor M'Call, M.R.C.V.S., said the big advances in the Palestine and Mesopotamia campaigns were made possible only by horses.

In August, 1914, he continued, the British Army possessed 25,000 horses. Within twelve days of the outbreak of war 165,000 horses were purchased, and in 1918 there were over a million horses in the British Army.

He described the hardships of exposure and short rations which the animals, like the troops, suffered. The mule, which was found to be a hardier animal than the horse, had also played an important part in the various theatres.

A film was shown illustrating veterinary hospitals and the treatment of sick and wounded animals.

The British Pharmaceutical Codex, in its monograph on potassium chlorate, gives the following warning note: "Large doses of potassium chlorate are actively poisonous; methæmoglobin is set free in the blood serum, the red corpuscles are disintegrated, and cyanosis results from deficient oxygenation of the blood, death occurring from respiratory failure; there may, however, be complete recovery from the acute symptoms, death occurring five or six weeks later from nephritis, caused by blocking of the fine renal tubules with the disintegrated blood debris." Various text books on toxicology and pharmacology refer to the dangers attendant upon the indiscriminate administration of potassium chlorate, although reference to the Registrar-General's Annual Reports demonstrates that recorded fatalities due to this agent are comparatively few.

At Edinburgh Town Council the Lord Provost's Committee has recommended no action with reference to the Diseases of Animals (Scotland) Bill, introduced into the House of Commons as a private member's Bill, and which proposes that the powers and duties of the Ministry of Agriculture in relation to Scotland under the Diseases of Animals Acts should be transferred to the Board of Agriculture for Scotland. The Lord Provost, moving approval of the recommendation, said their chief veterinary

officer was of opinion that the code of regulations for the diseases of animals should be one for the whole country, instead of one for Scotland, one for England, and one for Wales.

Mr. Rose, in moving that the Council support the Bill, said it was a small attempt to give Scotland a measure of Home Rule.

On a vote no action was carried.

PERSONAL.

A marriage has been arranged between Veterinary-Major Graham B. C. Rees-Mogg, 1st Life Guards, younger son of the Rev. H. J. and Mrs. Rees-Mogg, of Midgham Vicarage, Berkshire, and Kathleen, youngest daughter of the late Sir Frederick and Lady Wills, of Northmoor, Dulverton, and widow of Dr. Edward Douty, of Clifford Manor, Stratford-on-Avon.

ROYAL (DICK) VETERINARY COLLEGE, EDINBURGH.

At the recent graduation ceremony at the University of Edinburgh, the degree of B.Sc. in Veterinary Science was conferred on Robert Arthur Scrymgeour Macdonald.

Obituary.

BLACK, S., Nowshera. Graduated Dublin, 23rd July, 1906. Died 16th March, 1922.

DOWN, ALFRED JOHN, Exeter. Graduated London, 3rd January, 1881. Died 8th April, 1922. Aged 62.

HAINES, J. T., Evesham, Worcester. Existing Practitioner. Died 13th March, 1922.

HOWE, N., Macclesfield. Graduated Edinburgh, 20th December, 1897. Died 26th February, 1922. Aged 46.

KENDALL, J., Barrow-in-Furness. Graduated Edinburgh, 15th April, 1867. Died 8th March, 1922. Aged 80.

POTTS, F. H., High Street, Newmarket. Graduated London, 20th May, 1891. Died 7th March, 1922. Aged 53.

RUTHERFORD, CHARLES, Colonel, late A.V.S. Graduated Edinburgh, 16th April, 1879. Fellow 16th April, 1887. Died 2nd April, 1922.

SKUES, F. M., Bethlehem, O.F.S., S. Africa. Graduated Edinburgh, 16th July, 1897. Died 18th August, 1921.

WALLACE, A. S., Arbroath, Forfar. Graduated Edinburgh, 28th May, 1889.

WATSON, A., Dublin. Graduated N. Edinburgh, 19th July, 1886.

WHIPP, HARRY, Muston, Filey. Graduated N. Edinburgh, 16th April, 1898. Died 2nd April, 1922. Aged 47.

Correspondence.

Letters to the Editor should reach the Office not later than by the first post on Tuesday morning for insertion in following Saturday's issue.

All correspondence must bear the name and address of the contributor for publication.

The Editor does not hold himself responsible for the opinions of his correspondents.

The Incubation Period in Distemper.

Sir,—My main reason for writing the previous letter I sent you was to try to encourage mutual support among veterinary surgeons when any one of us is unfairly attacked. I am sure that we give our best energies to the public for very inadequate remuneration, and when any misfortune occurs to an animal we often receive undeserved blame, and this blame sometimes arises from the ignorance or malice of another practitioner. What I want to impress on those who are all out for self is that their action in saying something which hurts another practitioner is very likely at some subsequent date to react on themselves. Taking this subject of the incubation period of distemper, if one says, as Mr. Kirk does, that the outside limit of the period is three weeks, the day may come when this statement would be very inconvenient for its author. The question I should like answered is, On what facts is this opinion based? In ordinary private practice one does not often get the proper data on which to base any opinion. I should think that in less than 20 per cent. is the source of infection of a case of distemper known, and naturally to base an opinion on a minority of the cases with which one meets is most unreliable, though there is an almost irresistable temptation to do so. Then, also, one would expect that the longer periods of incubation would tend to be among the unknown or unremembered sources. One must realise that the general public does not possess an accurate, scientific mind, and its thoughts are rarely directed to the subject of infection until the disease has appeared. Nor have I found that one can trust the sagacity of many breeders of dogs, as I have learnt to discount gravely many of their statements. Further, their animals are alleged to suffer from so many diseases of obscure pathology such as "chills," "colds," "influenza," "worms," "chills on the liver," "teething fits," etc. I have also observed that there are members of the veterinary profession who use some or all of these terms in their contributions to "doggy" literature. One M.R.C.V.S., who modestly styles himself "Canine surgeon to H.M. the King, also to H.M. the Queen, and to the Kennel Club, the Dogs' Home, The Dumb Friends' League, The Bull Dog Club, etc., etc.," describes the symptoms of influenza of dogs as follows:—

> Dullness, loss of appetite, rise of temperature, pains in the loins, quick pulse. There is generally a cough, and bronchitis or pneumonia may develop. In some cases there is severe diarrhœa, and there may be some discharge from the nose.*

That is his whole description of this alleged disease of the dog. He does not say if it is contagious or not, nor does he give means whereby one can make a differential diagnosis from distemper.

This sort of thing, and other effusions by so-called "authorities" in the lay press, has had effect in causing the mind of the enthusiastic dog-breeder to become so confused that his statements are often misleading.

I have been at some pains to labour this point because we can only learn much by our own observations on large numbers of dogs kept together, and this we are rarely allowed to do from the earliest onset of the disease, and so we tend to fall back upon the owners' statements.

I think the practitioner can get a clue to the length of the period of incubation by watching the course of the disease in mild and prolonged cases. On occasion quite remarkable facts will be discovered, indicating that the animal has shown a definite symptom for a few days, then remained apparently quite well for several weeks, to be followed by a period of illness. This is what Mr. Gray refers to as the "silent phase." There is little difference between a silent phase and an incubation period, as merely the absence of those temporary initial symptoms would convert a silent phase into an incubation period or, rather, part of the incubation period. A symptom only means that we observe some definite manifestation of a disease which, in the case of distemper, may be going on just the same when there are no appreciable symptoms.

If one takes the trouble to make a number of *post-mortem* examinations of dogs dead of the enteric or nervous type, and which have not exhibited any respiratory symptoms at all, quite a large proportion will be found with numerous small patches of broncho-pneumonic lesions. I defy any of our most accomplished stethoscope experts to discover a solidified area measuring little more than an eighth of an inch in diameter. I really believe, though, that after some years of consistently delighting old ladies by its use on toy Pomeranians, etc., they begin to believe they can diagnose mild distemper broncho-pneumonia thereby (particularly when they are informed that the animal has been coughing). Even in advanced

* A. J. Sewell in *The Dogs Medical Dictionary.*

cases of pneumonia with larger areas of consolidation due to the coalescence of numerous small *foci* these are rarely large enough to cause loss of resonance sufficient for diagnostic purposes, when one takes into consideration the sounds caused in many breeds by restricted nasal passages, the frequent presence of mucous discharge in the same, the small size of the chest in many breeds, and the overwhelming heart sounds in the dog.

If one were to believe the writer at present exhibiting his ignorance in the "doggy" press, one could diagnose all these cases by merely taking the animal's temperature.

While I was acting for the Distemper Vaccination Commission in 1903 I took the temperature of all dogs daily, as well as systematically recording other symptoms, I found over 20 per cent. of those dying of the disease had not once developed an abnormally high temperature, and some of these had pneumonic lesions.

The determination of the period of incubation rests on the recognition of symptoms. My belief is that the milder the case the longer the period of incubation may be; but one must also realise that one never knows what will happen to an apparently mild case, as some of these terminate seriously. It is easy to fail to diagnose the apparently mild case. In isolated cases it is practically impossible to make a definite diagnosis. It is only when we have numbers of puppies kept together that we can satisfactorily diagnose these mild cases. A great deal of error and difference of opinion arise, I consider, from some practitioners not realising some of the difficulties of diagnosis in distemper.

As direct evidence regarding the period of incubation of distemper furnished by the experiments mentioned above, I had cases of puppies remaining apparently healthy and retaining a normal temperature while living with and feeding with others exhibiting symptoms for periods up to eight weeks before showing a symptom.

I must apologise for the length of this letter. My desire is to expose error which may react harmfully on anyone of us, who, owing to the decline in numbers of the horse, are forced to serve the public in another direction, humble though it be. In order to avoid possible serious trouble, many have felt it wise to refuse to take dogs under their care below a certain age and affected with certain diseases. Some of these, doubtless, find their way to one of those charitable establishments which now seriously challenge the practitioner. These, being kind, beneficent charities, can do no wrong whatever happens; moreover, some of them have the prestige of the "Veterinary surgeon to H.M. the King, and also to H.M. the Queen, etc.," at their call, or had when the *magnum opus* mentioned above was printed.

Yours truly,

F. O. PARSONS. The Mall, Ealing.

April 10th, 1922.

Army Veterinary Service.

LONDON GAZETTE, WAR OFFICE—TERRITORIAL ARMY.

April 21st.—The announcement regarding Captain C. Hartley, F.R.C.V.S., which appeared in *Gazette* February 2nd, is cancelled.

Captain J. H. Lockwood (late Veterinary Captain Imperial Yeomanry) relinquishes his commission (March 17th), under A.O. 166/21, as amended by A.O. 332/21, and is granted the rank of Major (substituted for that in *Gazette* March 16th).

Captain C. Taylor resigns his commission (April 22nd), and retains the rank of Captain.

Diseases of Animals Acts, 1894 to 1914. Summary of Returns.

Period.	Rabies. Cases Confirmed. Dogs.	Rabies. Cases Confirmed. Other Animals.	Anthrax. Outbreaks confirmed.	Anthrax. Animals attacked.	Foot-and-Mouth Disease. Outbreaks confirmed.	Foot-and-Mouth Disease. Animals slaughtered as diseased or exposed to infection.	Glanders (including Farcy).* Outbreaks reported by the Local Authorities.	Glanders (including Farcy).* Animals attacked.	Parasitic Mange. Outbreaks reported by the Local Authorities.	Parasitic Mange. Animals attacked.	Sheep Scab. Outbreaks reported by the Local Authorities.	Swine Fever. Outbreaks confirmed.	Swine Fever. Swine slaughtered as diseased or exposed to infection
GT. BRITAIN.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.
Week ended 15th April, 1922 ...	...	...	16	17	9	811	...	...	15	25	9	18	4
Corresponding Week in 1921	1	...	6	8	...	54	...	...	67	98	10	28	8
Corresponding Week in 1920	1	...	9	10	...	...	...	...	90	159	2	49	19
Corresponding Week in 1919	5	...	4	5	...	...	1	8	114	210	8	22	10
Total for 15 weeks, 1922 ...	...	...	196	216	1075	52047	...	...	571	862	380	343	121
Corresponding period in 1921	18	1	199	233	25	2389	3	6	1122	1788	337	337	98
Corresponding period in 1920	4	...	147	179	39	2001	9	16	1966	3491	258	651	233
Corresponding period in 1919	41	2	56	76	19	1033	5	28	2366	4689	202	342	115

NOTE.—The figures for the current year are approximate only. *Excluding outbreaks in Army horses.

IRELAND.												
Week ended 15th April, 1922	...	...	...	...	...	...	...	...	Outbreaks 1	1	11	20
Corresponding Week in 1921 ...	...	...	...	...	...	...	...	...	2	9	2	23
Corresponding Week in 1920 ...	...	...	...	...	...	...	...	...	....	3	...	6
Corresponding Week in 1919 ...	...	...	...	...	...	...	...	...	5	4	...	...
Total for 15 weeks, 1922 ...	...	...	...	...	...	...	...	...	50	94	81	436
Corresponding period in 1921 ...	...	...	2	41	...	...	...	...	33	124	21	158
Corresponding period in 1920 ...	...	...	...	...	...	...	1	3	53	134	2	11
Corresponding period in 1919 ...	...	...	...	...	...	...	1	1	53	125	14	47

NOTE.—The figures for the current year are approximate only.

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VETERINARY VISITS TO BELGIUM AND ITALY.

Arrangements have been made for Special Visits of Veterinary Surgeons, their wives and friends, for

Seven Days at Whitsuntide

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£9 - 9 - 0 inclusive.

Also for Three Weeks in September (when the Congress of Comparative Pathology is held in Rome) to ROME, FLORENCE, MILAN, TURIN, VENICE and NAPLES, **£40**, visiting the Veterinary Schools.

The President of the Congress of Comparative Pathology is PROFESSOR PERRONCITO, formerly the Director of the Royal Veterinary School attached to the University of Turin.

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